Fuel System (Ford VV Carburettor) 23V

Index

	Page
General Description	2
Principle of Operation	7
Starting Procedure	18
Fuel Handling Safety Precautions	19
Service Adjustment and Checks	20
Special Service Equipment Recognition ..	21
Service and Repair Operations Content ..	22
Service and Repair Operations	23
Technical Data	39

GENERAL DESCRIPTION

FORD V.V.
CARBURETTOR

The basic carburettor design used by Ford Motor Co. in recent years has been of the fixed venturi type, utilising a fixed size main jet system. This type of carburettor has proven highly successful in meeting the requirements for good performance and acceptable fuel consumption.

During the last decade an additional requirement has been introduced, namely the need to reduce atmospheric pollution and Governments throughout the world have passed legislation stating that the internal combustion engine must meet specific standards of low pollution (emission) levels. Compliance with legislation laid down by European governments has been achieved in the 1970's by developing the Ford fixed venturi carburettor. For example during 1975 a new design idle system known as the 'Sonic' or 'By-pass' idle system, was introduced onto the Ford carburettor to ensure that Ford engines met the 1976 increased severity emission legislation without any detrimental effect on drive charactoristics.

As time passes emission legislation in Europe will become more strict and to ensure Ford engines meet these strict emission levels a completely new carburettor has been designed and developed for the 1980's.

The Ford Variable Venturi unit is this carburettor and will progressively be fitted on all Transit (1V) variants (except the 2,0 litre heavy duty) starting from May 1980.

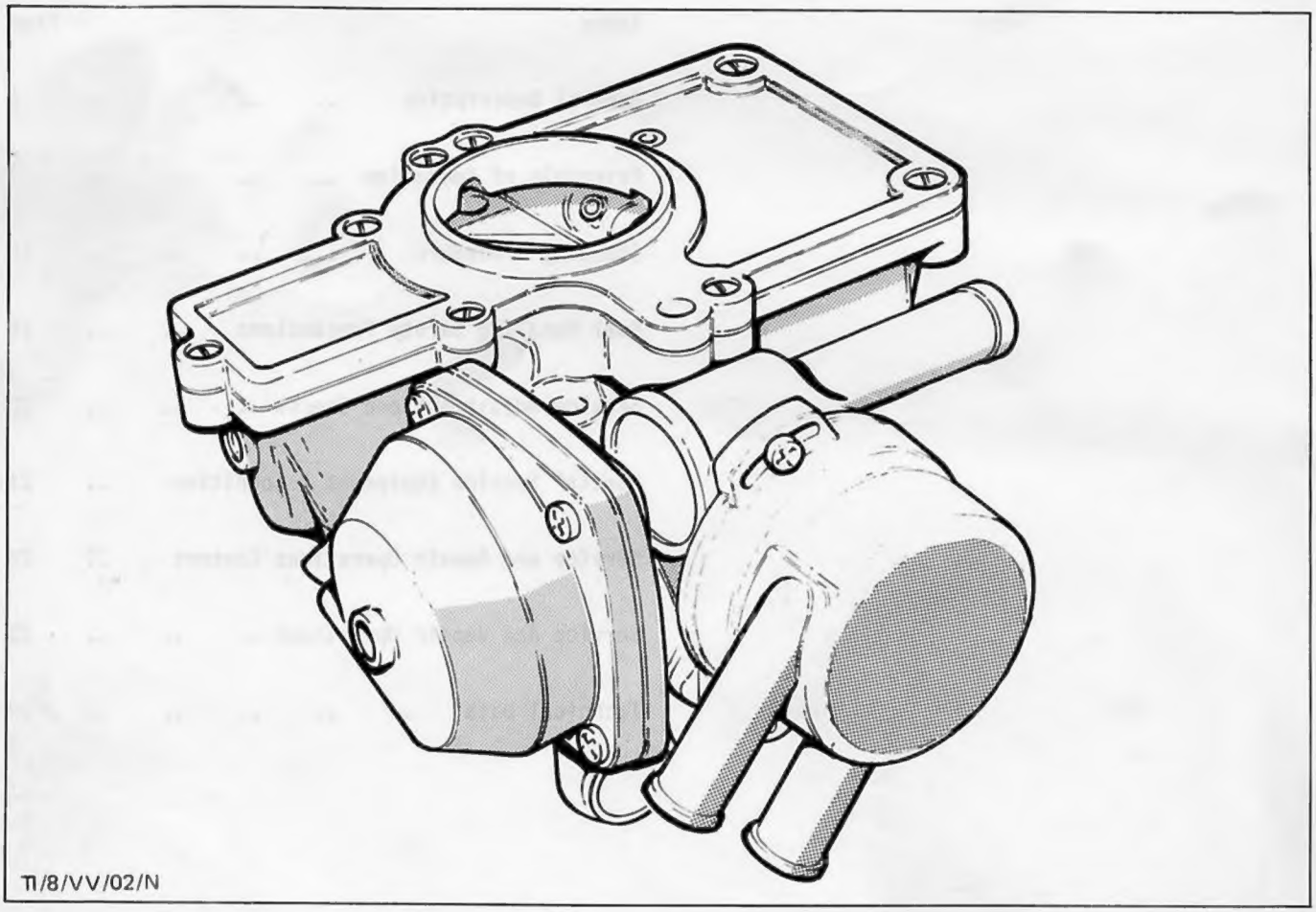
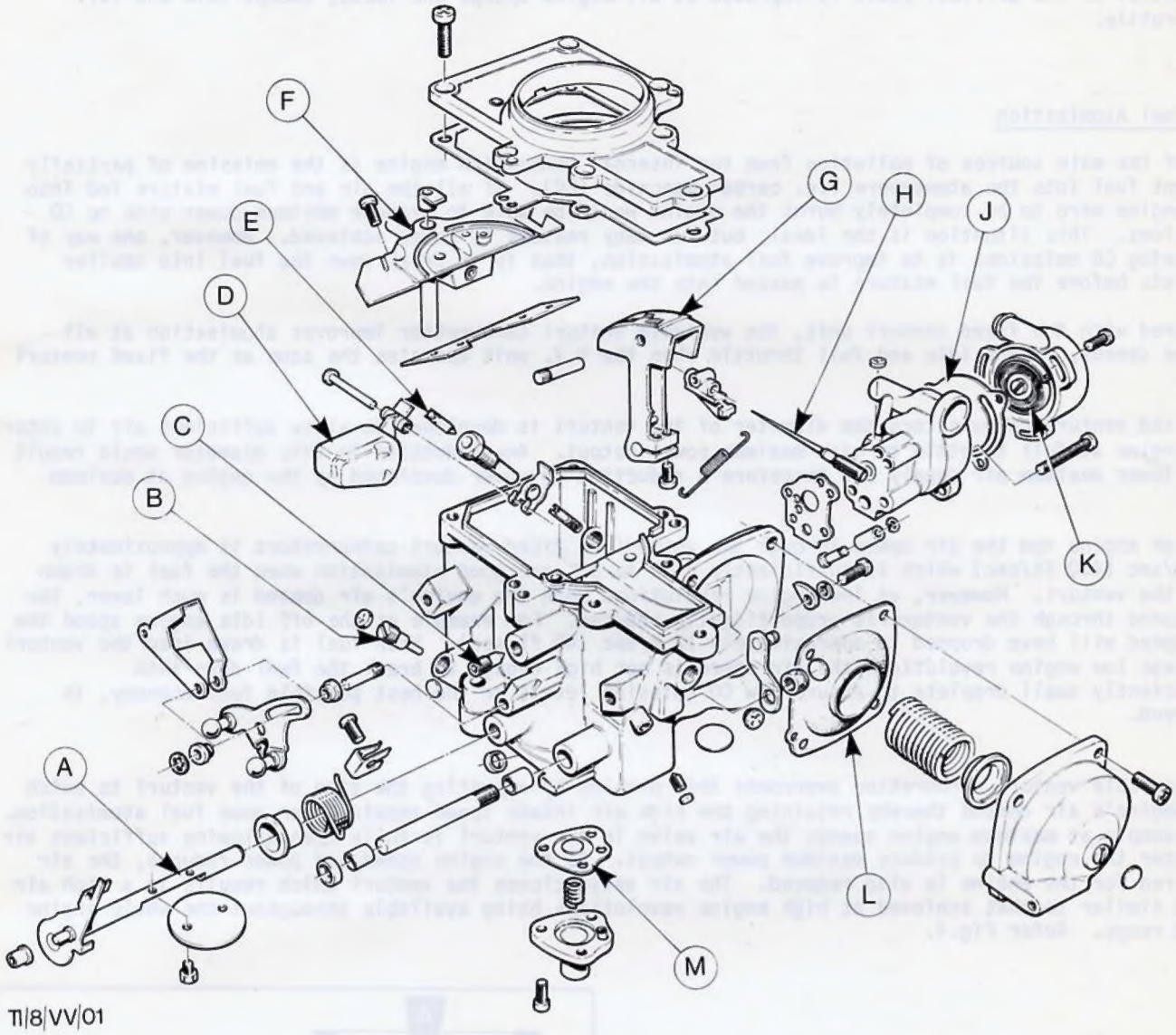


Fig.1. The Ford Variable Venturi Carburettor.

GENERAL DESCRIPTION (cont'd)



TI|8|VV|01

Fig.2. Exploded view of V.V. carburettor.

A - Throttle spindle
B - Mixture screw
C - By-pass leak adjuster
D - Float
E - Needle valve
F - Main jet body
G - Air valve
H - Metering rod
J - Choke assembly
K - Bi-metal coil
L - Vacuum diaphragm
M - Accelerator pump diaphragm

GENERAL DESCRIPTION (cont'd)

FORD V.V. CARBURETTOR

When compared with the fixed venturi carburettor the variable venturi unit improves emissions, fuel economy and general engine performance for two main reasons;

1) Fuel atomisation (the mixing of fuel into the air stream) is improved, especially at low engine speeds and loads, and

2) Control of the air/fuel ratio is improved at all engine speeds and loads, except idle and full throttle.

1) Fuel Atomisation

One of the main sources of pollution from the internal combustion engine is the emission of partially unburnt fuel into the atmosphere i.e. carbon monoxide (CO). If all the air and fuel mixture fed into the engine were to be completely burnt the engine would be able to produce maximum power with no CO emissions. This situation is the ideal, but for many reasons is never achieved. However, one way of improving CO emissions is to improve fuel atomisation, that is to break down the fuel into smaller droplets before the fuel mixture is passed into the engine.

Compared with the fixed venturi unit, the variable venturi carburettor improves atomisation at all engine speeds, except idle and full throttle when the V.V. unit operates the same as the fixed venturi unit.

On fixed venturi carburettors the diameter of the venturi is developed to allow sufficient air to enter the engine at full throttle to give maximum power output. Any reduction in this diameter would result in a lower maximum air supply and therefore a reduction in power developed by the engine at maximum rpm.

At high engine rpm the air speed through the venturi on fixed venturi carburettors is approximately 120 m/sec (400 ft/sec) which is sufficiently high to achieve good atomisation when the fuel is drawn into the venturi. However, at low engine revolutions when the engine's air demand is much lower, the air speed through the venturi is proportionally reduced. For example at the off idle engine speed the air speed will have dropped to approximately 12 m/sec (40 ft/sec). When fuel is drawn into the venturi at these low engine revolutions the air speed is not high enough to break the fuel down into sufficiently small droplets to ensure low CO emission levels or the best possible fuel economy, is achieved.

The variable venturi carburettor overcomes this problem by adjusting the size of the venturi to match the engine's air demand thereby retaining the high air intake speed required for good fuel atomisation. For example at maximum engine speeds the air valve in the venturi is fully open allowing sufficient air to enter the engine to produce maximum power output. As the engine speed and power reduces, the air required for the engine is also reduced. The air valve closes the venturi which results in a high air speed similar to that achieved at high engine revolutions being available throughout the whole engine speed range. Refer Fig.4.

Fig.3, shows the fixed venturi carburettor at a low engine rpm and load with fuel being drawn into the air stream, flowing at a speed of approximately 12 m/sec (40 ft/sec).

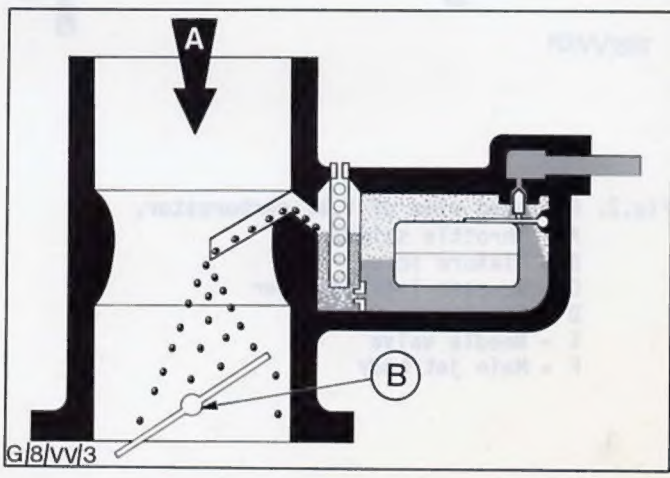


Fig.3. Fixed venturi carburettor at low engine rpm and load.
A - Air Intake
B - Throttle plate

GENERAL DESCRIPTION (cont'd)

FORD V.V. CARBURETTOR

Fuel Atomisation (cont'd)

Fig.4, shows the variable venturi carburettor also in the low engine rpm situation. Note that the air valve has reduced the size of the venturi resulting in a much higher air speed, in the region of 90 m/sec (300 ft/sec) compared with the fixed choke unit which as we have shown only achieves an air speed of approximately 12 m/sec (40 ft/sec).

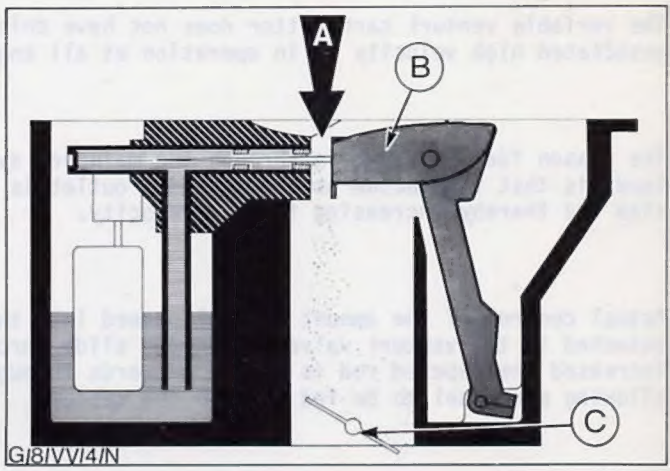


Fig.4. Variable Venturi Carburettor at low engine rpm and load.
A - Air intake
B - Air valve (almost closed)
C - Throttle plate

It can therefore be seen that at all cruise engine speeds (up to approximately 4000 rpm except idle) fuel atomisation and therefore CO emissions are vastly improved on the variable venturi carburettor.

In addition to the reduction in emission levels the improved quality fuel atomisation allows the engine to be operated on a leaner air/fuel ratio without any loss of power. This results in an overall improvement in fuel consumption.

2) Air/Fuel Ratio Control (Main Jet System)

Control of the air supply on both types of carburettor is achieved by a throttle butterfly plate mounted in the venturi. It is in the method of controlling the fuel that the two types of carburettors differ. On the fixed venturi unit the main system does not discharge until the throttle plate is open and the increased air flow creates sufficient vacuum to pull fuel through the main nozzle.

It is difficult to achieve a smooth transition from the idle to the main system and at the point where the main jet system comes into operation, fuel atomisation is poor with large droplets of fuel being fed into the engine. To ensure a good drive condition is achieved during this period the mixture strength is richened to compensate for the poor fuel atomisation.

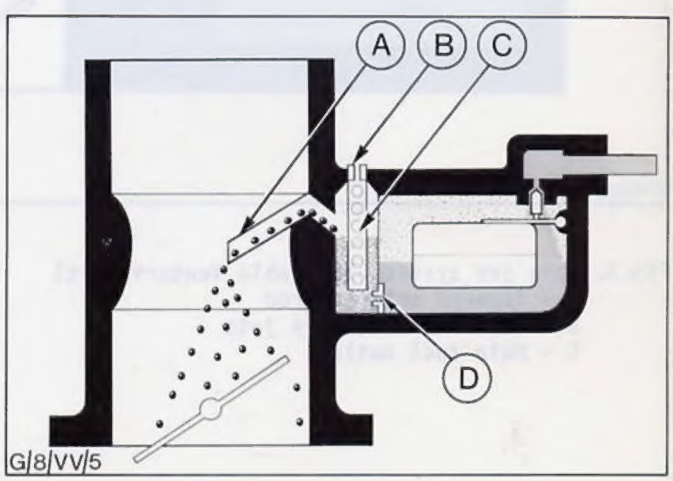


Fig.5. Main jet system. (Fixed venturi unit)
A - Main fuel outlet
B - Air bleed
C - Emulsion tube
D - Main jet

GENERAL DESCRIPTION (cont'd)

FORD V.V.
CARBURETTOR

The variable venturi carburettor does not have this disadvantage because the main jet system with its associated high velocity is in operation at all engine speeds and loads. Refer Fig.6.

The reason fuel is drawn in through the main jet system on V.V. carburettors at low engine speeds and loads is that the vacuum at the main jet outlet is high, due to the air valve reducing the venturi size and thereby increasing the air velocity.

Actual control of the amount of fuel passed into the engine is achieved by a tapered metering rod attached to the venturi valve, which can slide through the main jet. As the engine's fuel demand is increased the tapered rod is pulled outwards through the main jet so increasing the main jet size allowing more fuel to be fed through the system.

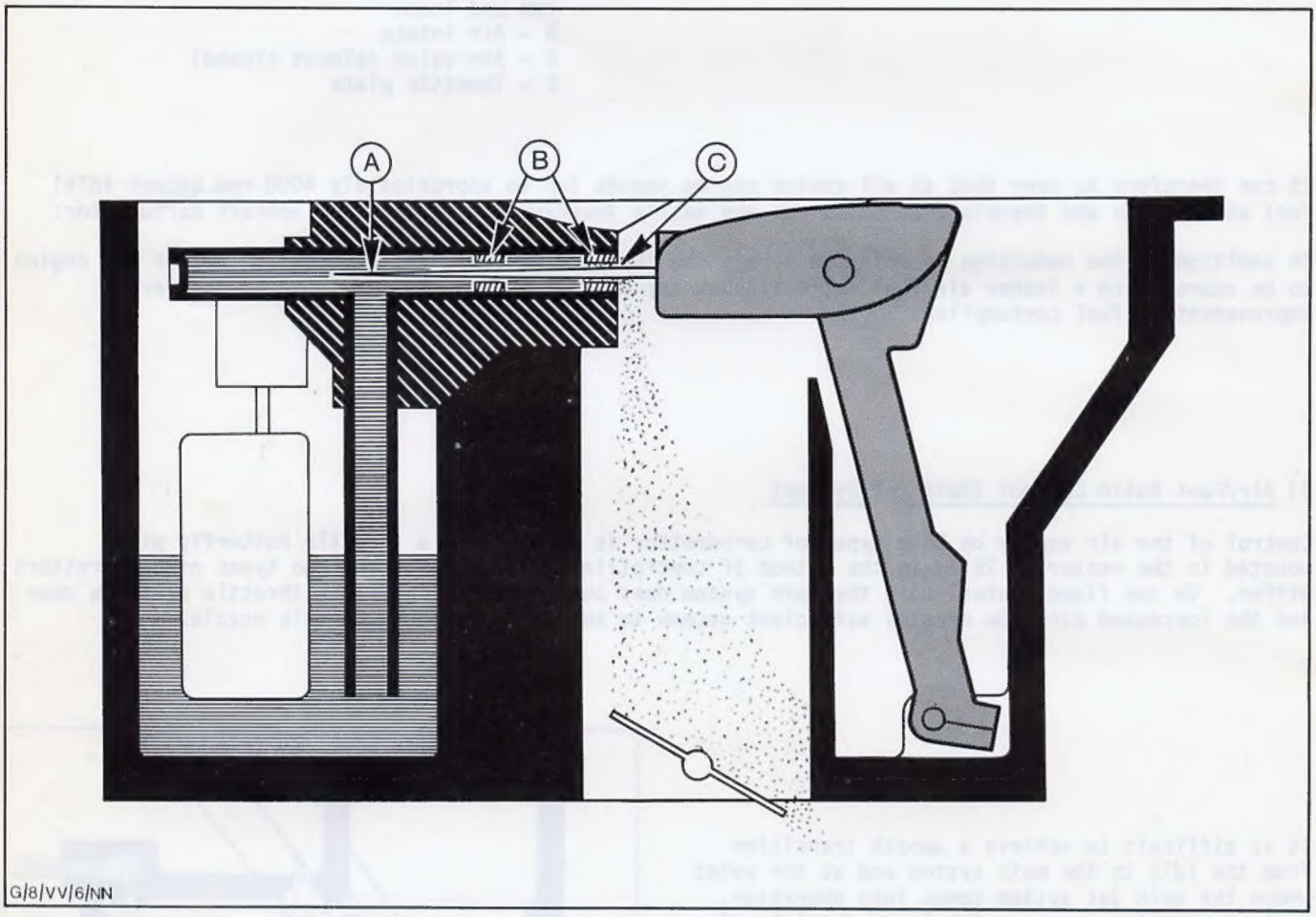


Fig.6. Main jet system. (Variable Venturi Unit)
A - Tapered metering rod
B - Main and secondary jets
C - Main fuel outlet

PRINCIPLE OF OPERATION

FORD V.V.
CARBURETTOR

Although the carburettor looks, and is in fact a sophisticated piece of equipment, it is basically only a series of simple systems. To help in explaining the operation of the V.V. carburettor the principle of operation section has been split into 9 parts covering each system. The individual systems are listed below with the appropriate page number shown alongside for ease of reference.

	Page
a) Fuel input	7
b) Venting system	8
c) Air Control	9
d) Main fuel control	10
e) Idle system	11
f) Throttle operation	12
g) Accelerator pump	13
h) Choke operation	15
j) Anti dieselling valve	18

a) Fuel Input System

Control of the fuel input is achieved by the same method as that used on the Ford fixed venturi carburettor. The system consists of an intake filter "A" in Fig.7, located in the input tube, a needle valve "B" and float "D" located in the float chamber.

As the fuel level in the float chamber drops the needle valve is opened allowing fuel, at lift pump pressure, to pass into the float chamber. As the level rises the float closes the valve and stops any further flow of fuel.

The float level on variable venturi carburettors is not adjustable as small variations in fuel level have no effect on carburettor performance.

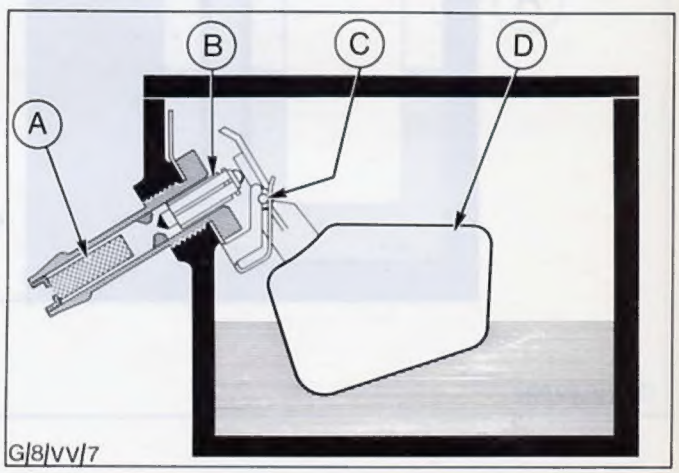


Fig.7. Fuel input system.
A - Inlet filter
B - Needle valve
C - Float pivot
D - Float

PRINCIPLE OF OPERATION (cont'd)

FORD V.V. CARBURETTOR

Fuel Input System (cont'd)

The needle valve has an override system which consists of a light spring, built into the valve, and a ball. The purpose of the system is to ensure that a steady force is exerted on the needle against the valve seat over a range of float travel. This reduces needle chattering caused by engine and vehicle vibration which would otherwise lead to an unacceptable rise in fuel level.

The leading end of the valve is 'Viton' coated, this is a thin rubberised coating applied to ensure a good seal is achieved between the valve and valve body.

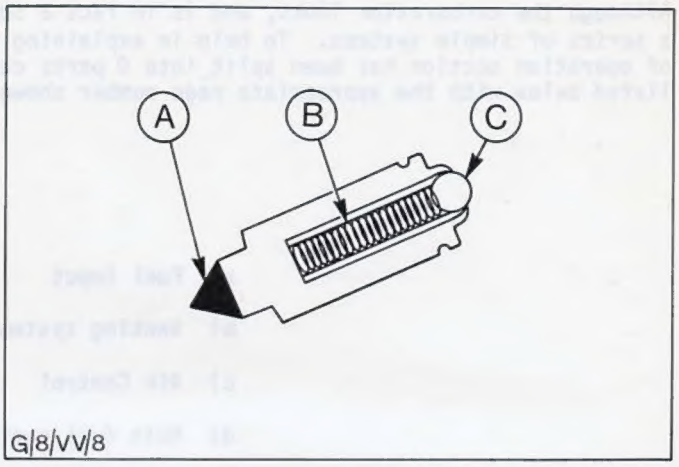


Fig.8. Needle valve assembly.
A - Lead end 'Viton' coated
B - Spring
C - Ball

b) Float Chamber Vent System

In countries where emission levels are strict it is not possible to allow petrol vapour, concentrated in the float chamber, to be emitted directly to atmosphere. The V.V. carburettor has therefore been designed with a closed or internal vent system. This has been achieved by venting the petrol vapour from the float chamber, through a drilling in the main jet body and into the carburettor air inlet. Refer Fig.9.

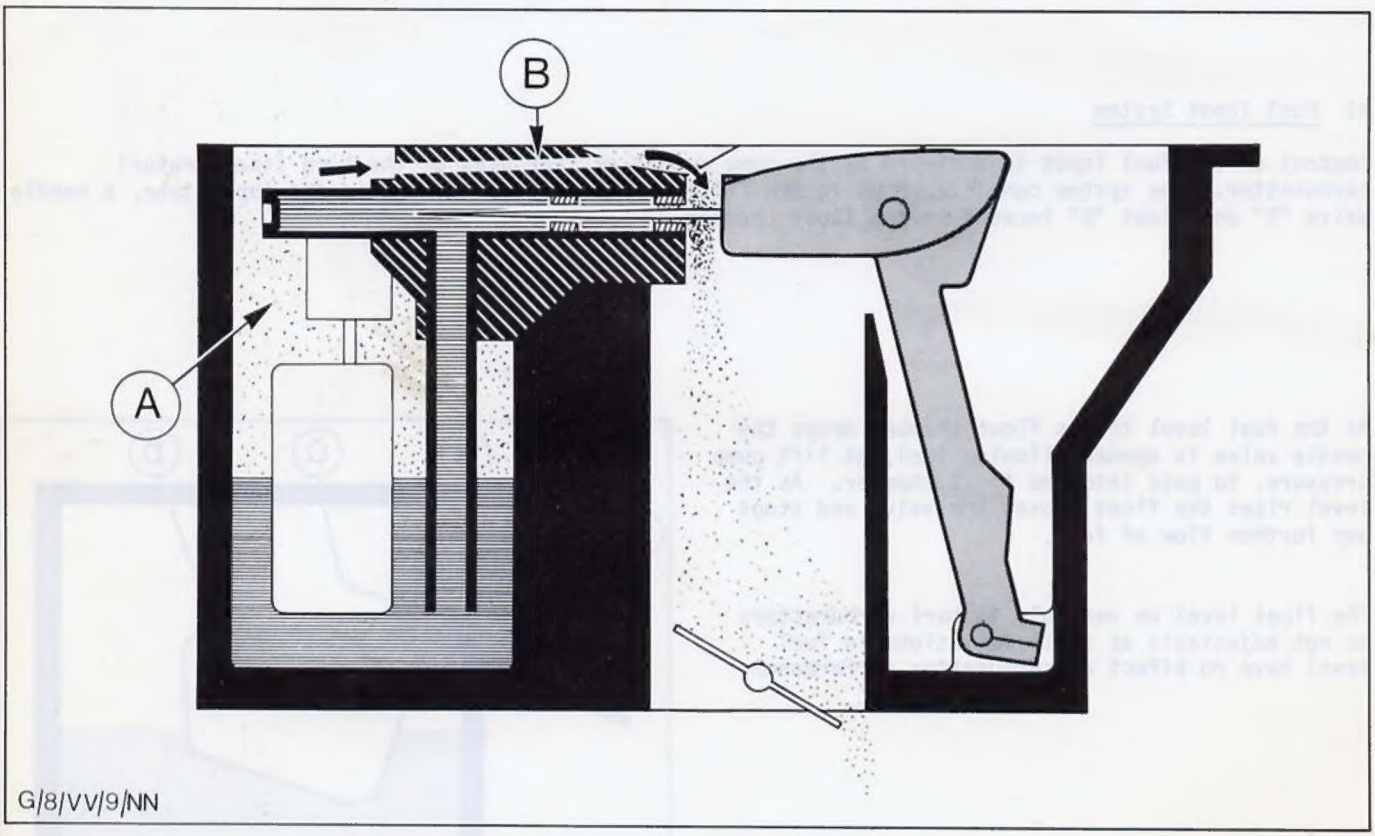


Fig.9. Float chamber vent system.
A - Fuel vapour
B - Vent gallery

PRINCIPLE OF OPERATION (cont'd)

FORD V.V. CARBURETTOR

c) Air Control

As shown in the General Description section, the main advantage of the V.V. carburettor is its ability to create a high air intake speed and therefore good quality fuel atomisation at low engine speeds and loads. This is achieved by the air valve which opens or closes the size of the venturi to respond to the engine's air demand. The air valve is operated by a diaphragm which is controlled by vacuum, sourced from a point in the venturi between the air valve and throttle butterfly. This depression created in the venturi is known as the control vacuum. The air valve and vacuum diaphragm are directly coupled which means that any movement of the diaphragm is directly transfered through levers to the air valve. See Fig.10.

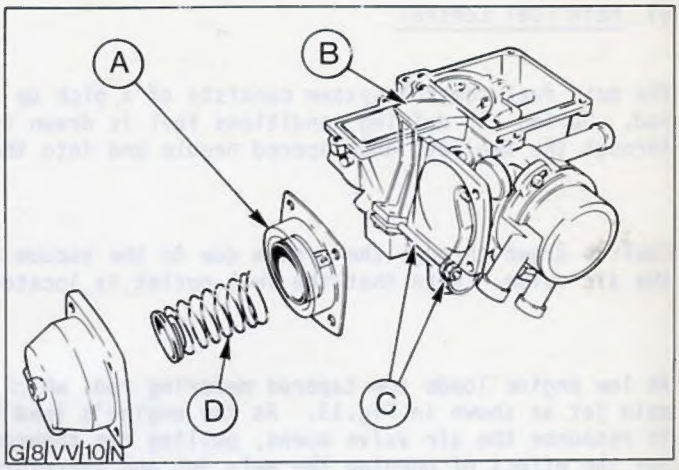


Fig.10. Air control system.
A - Vacuum diaphragm
B - Air valve
C - Operating linkage
D - Diaphragm return spring

At idle when the engine air requirements are low the air valve is held in its rest position by the diaphragm return spring. See Fig.11. This results in a high air speed over the main jet outlet, but because the throttle plate is closed the control vacuum is comparatively low. As the throttle plate is opened the engine's air demand rises and the control vacuum in the venturi increases. This control vacuum is fed to the diaphragm which pulls back, against a spring load, and opens the air valve until a balance between the forces of the control spring and the control vacuum are equal.

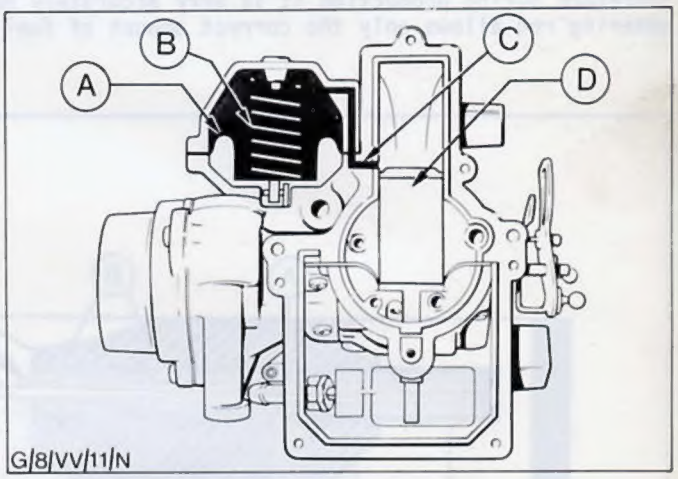


Fig.11. Air/Vacuum control system at idle.
A - Vacuum diaphragm
B - Return spring
C - Control vacuum source
D - Air valve (closed)

As the throttle is further opened the air valve will also open further until again the two opposing forces of the control spring and control vacuum are equal.

This balancing of the two opposing forces continues throughout the whole speed range up to maximum air valve opening. See Fig.12.

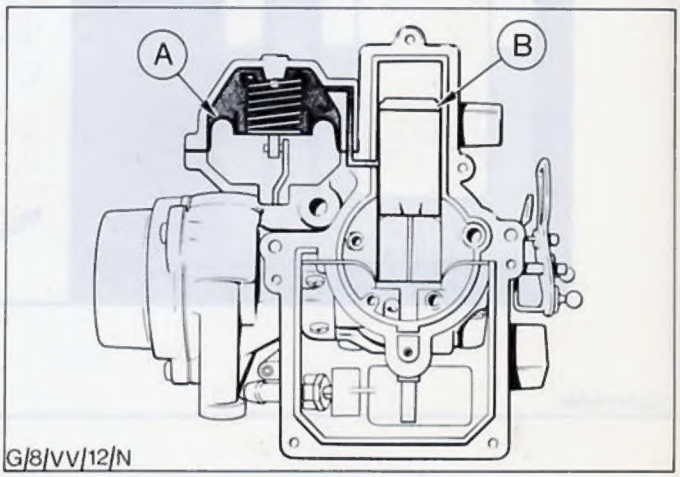


Fig.12. Air/Vacuum control system at full throttle.
A - Vacuum diaphragm
B - Air valve (fully open)

PRINCIPLE OF OPERATION (cont'd)

FORD V.V.
CARBURETTOR

d) Main Fuel Control

The main fuel control system consists of a pick up tube, main and secondary jets and a tapered metering rod. During all driving conditions fuel is drawn from the float chamber, up the pick up tube, metered through the two jets and tapered needle and into the engine.

Fuel is drawn through the system due to the vacuum created in the venturi between the main jet body and the air valve. Note that the fuel outlet is located opposite the air valve.

At low engine loads the tapered metering rod, which is attached to the air valve, almost closes the main jet as shown in Fig.13. As the engine's load increases so does the engine's air requirements and in response the air valve opens, pulling the tapered needle through the main and secondary jets. This has the effect of opening the main jet and therefore allowing additional fuel to be supplied to the engine.

The contour of the taper on the metering rod controls the amount of fuel supplied to the engine. Therefore during production it is very accurately machined to ensure that at any given engine load the metering rod allows only the correct amount of fuel to pass into the engine.

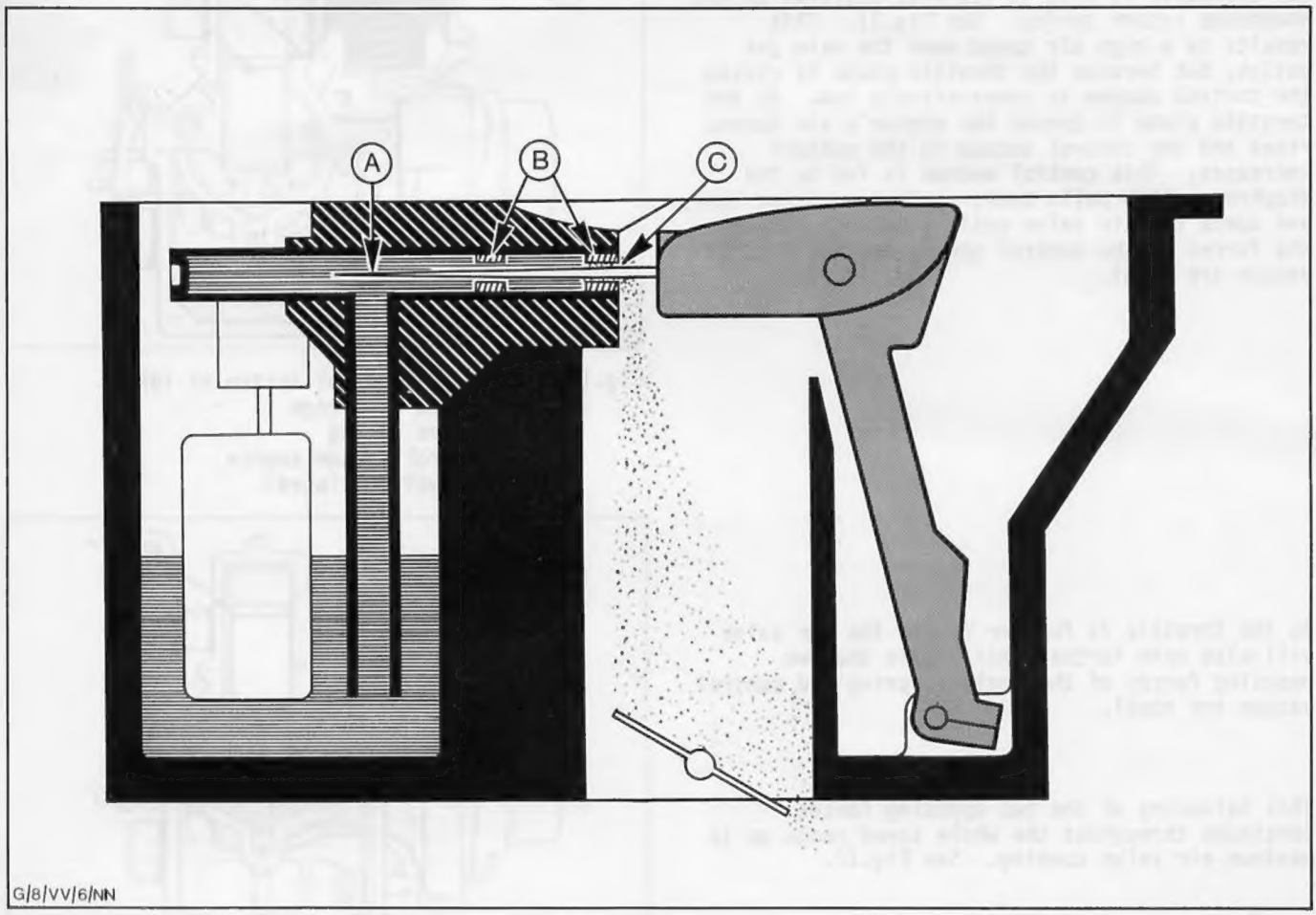


Fig.13. Main jet system.
A - Tapered needle valve
B - Main and secondary jets
C - Main fuel outlet

PRINCIPLE OF OPERATION (cont'd)

FORD V.V.
CARBURETTOR

e) Idle System

The sonic idle system that was built into the Ford fixed venturi carburettor for 1976 to 1978 engines has been so successful in meeting idle emission levels that the same basic system has been built into the V.V. unit. The system achieves extremely low emission levels, at idle, because fuel is atomised in an air stream flowing at super-sonic velocity which produces a shock wave. On V.V. carburettors 70% of the idle fuel mixture is supplied through the sonic idle system, the remaining 30% being drawn from the main system. This proportioning has been found to give optimum idle quality with an idle CO that remains stable with temperature changes.

With the exception of the air bleed, "C" in Fig.14, all the air used by the engine at idle is drawn past the venturi and main jets. It then splits into two streams, one passes the throttle plate and the other passes round the sonic idle system where more fuel is added. The quantity passing the throttle plate can be varied to provide idle speed adjustment. The small opening of the throttle plate also prevents the butterfly becoming siezed in the bore as the carburettor body contracts during the cooling period after engine switch off.

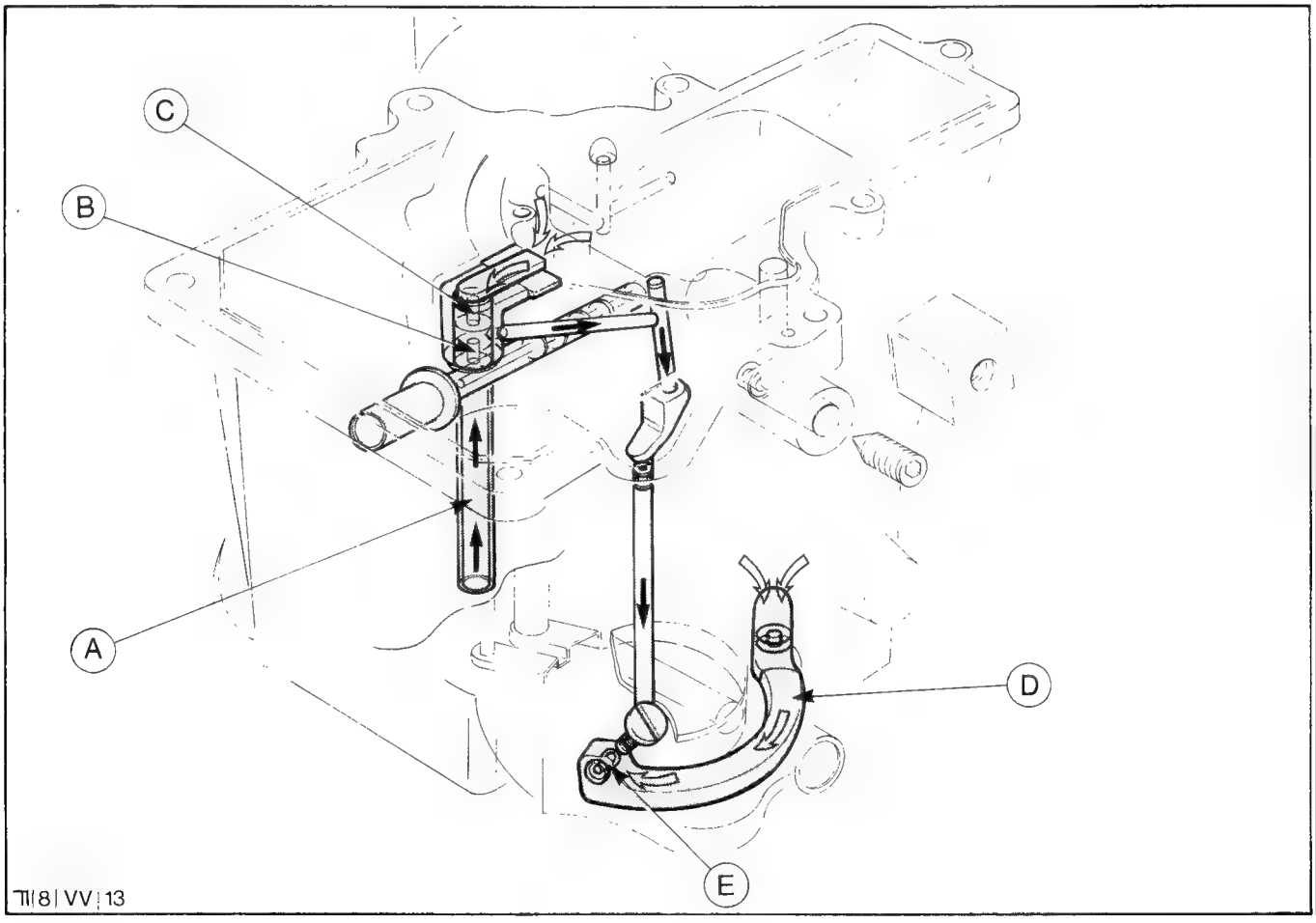


Fig.14. Idle System.
A - Main pick up tube
B - Idle fuel jet
C - Idle air jet
D - By-pass gallery
E - Sonic discharge tube

PRINCIPLE OF OPERATION (cont'd)

FORD V.V. CARBURETTOR

Idle System (cont'd)

Fuel supply for the idle system is sourced from the main pick up tube, metered through the idle jet, refer "B" in Fig.15, and mixed with air from an air bleed fitted into the main jet body. Refer "C" in Fig.15. The rich air/fuel mixture is then drawn through internal galleries down to the mixture control screw which regulates the amount of fuel to be fed into the engine from the idle system. The fuel mixture is then atomised with air drawn through the by-pass idle channel and fed into the engine through the sonic discharge tube.

Because of the high pressure difference that exists across the discharge tube the air is accelerated to a high speed (approximately 365 m/sec, 1200 ft/sec) and forms shock waves. The fuel is atomised when the droplets pass through these shock waves and is then fed directly into the inlet manifold below the throttle plate.

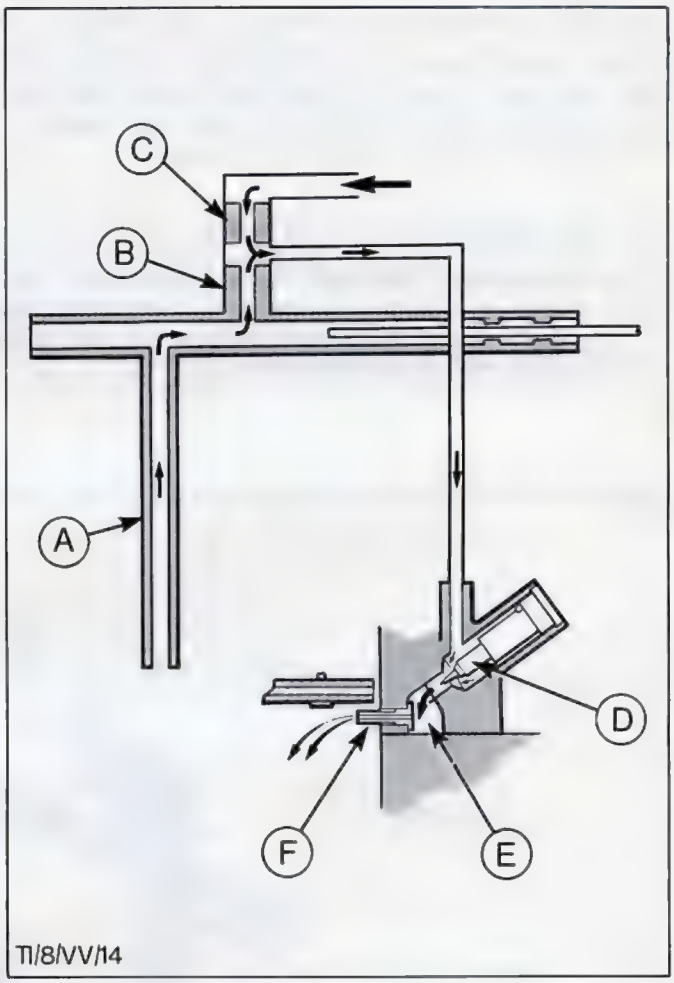


Fig.15. Idle system. (schematic)
A - Main pick up tube
B - Idle fuel jet
C - Idle air bleed jet
D - Mixture screw
E - Air by-pass channel
F - Sonic discharge tube

f) Throttle Operation

The same basic size of V.V. carburettor is used for all (IV) engine variants, therefore it can be seen that the throttle bore has to be sufficiently large to pass the air requirements for the larger engines to meet its power needs. However on the smaller engines maximum air requirements can be achieved with only 75% of throttle. This could make initial opening very sensitive giving poor driveability.
To overcome this the throttle linkage has been made progressive, see Fig.16, with a cam and roller mechanism so that a large initial throttle pedal movement will only give a small throttle plate opening. As the full pedal travel is approached the throttle plate movement is very rapid.

This gives a better feel on all engine sizes for slow speed traffic crawl, aiding economy and in addition giving good engine response throughout the full range of pedal travel on the smaller engines.

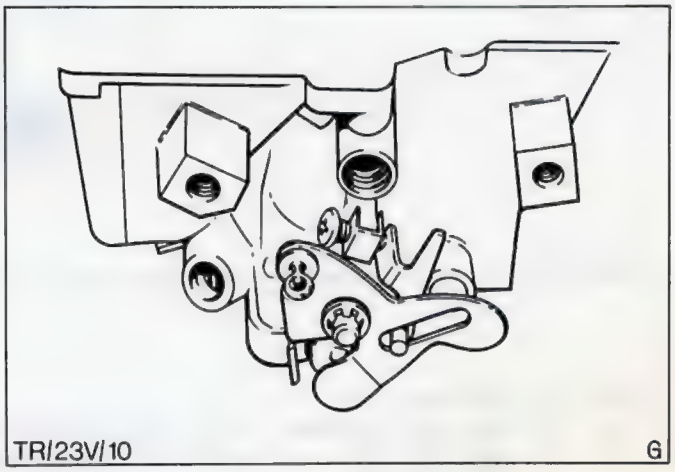


Fig.16. Progressive throttle system.

PRINCIPLE OF OPERATION (cont'd)

FORD V.V.
CARBURETTOR

g) Accelerator Pump

The fuel and air supply systems, previously described, operate completely successfully during steady state or cruise conditions. However, during transient conditions i.e. when the throttle pedal is moved to accelerate, the manifold vacuum drops and there is a time lag before a stable fuel/air balance condition is re-established in the inlet manifold. If no compensation were to be made for this time lag a flat spot or hesitation would result.

The Variable Venturi carburettor has two systems to compensate for the time lag. One is a restrictor fitted in the air passage between the control diaphragm and the control vacuum area. This causes the valve opening to react slowly to an increase in air flow causing a momentary higher vacuum at the main jet because of the increased air velocity. The higher vacuum results in an increased fuel flow.

The first system compensates for all but very large reductions in manifold vacuum. For these relatively large amounts of fuel are required. To deliver this extra fuel an accelerator pump system is fitted to the carburettor. See Fig.17.

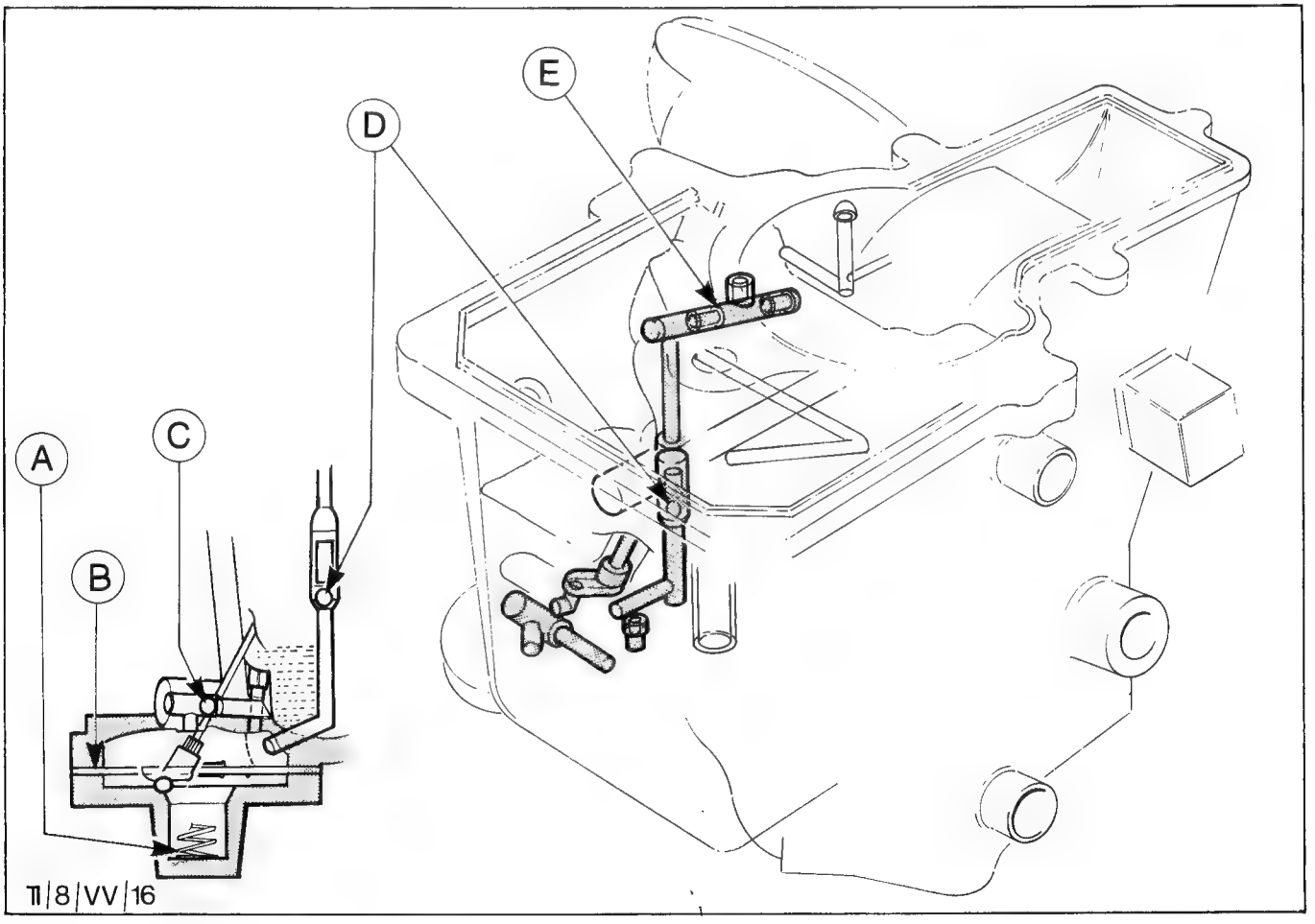


Fig.17. Accelerator pump system.
A - Return Spring
B - Diaphragm
C - Intake one way valve
D - Outlet one way valve
E - Pump jet

PRINCIPLE OF OPERATION (cont'd)

FORD V.V. CARBURETTOR

Accelerator Pump (cont'd)

Unlike the accelerator pump fitted on fixed venturi units the V.V. pump is vacuum controlled.

The system senses the fall in manifold vacuum and injects fuel directly into the venturi enriching the mixture so minimising any hestitation. Under normal operating conditions a vacuum, obtained from beneath the throttle plate, is available at the pump and pulls a diaphragm back against a spring load. This in turn draws fuel, through internal galleries, from the float chamber. In this situation the inlet one way valve, "F" in Fig.18, in the pump is open and the outlet one way valve "C" is closed.

When the vehicle is accelerated the vacuum signal beneath the throttle plate drops rapidly which results in the return spring pushing the diaphragm back to its rest position. The fuel reserve that was initially drawn into the pump is then injected through internal galleries past the outlet one way valve and into the venturi. See Fig.19.

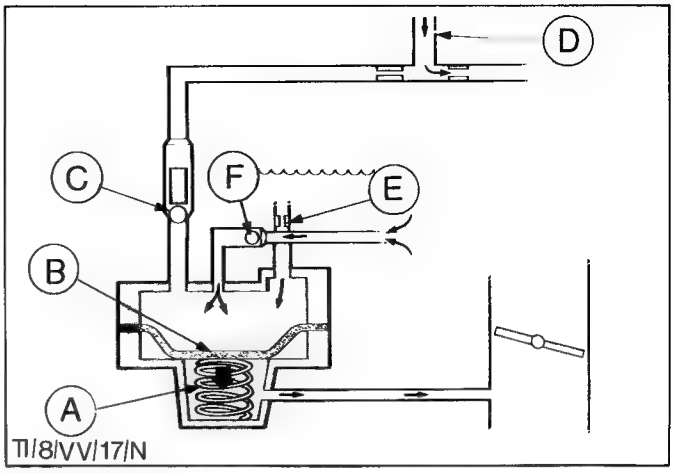


Fig.18. Accelerator pump system - Inlet.
A - Return spring (Compressed)
B - Diaphragm
C - One way valve
D - Vacuum break air hole
E - Back bleed
F - One way valve

As shown in Fig.18, the system also includes a back bleed "E" located in the pump and a vacuum break air hole "D" located at the fuel outlet.

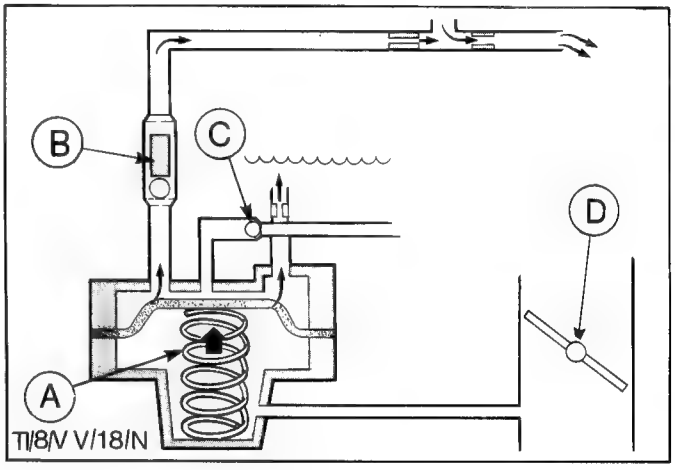


Fig.19. Accelerator pump system - Outlet. (schematic)
A - Return spring (extended)
B - Outlet one way valve (open)
C - Inlet one way valve (closed)
D - Throttle plate (open)

Pump Back Bleed

During prolonged idle such as that experienced during traffic congestion the air temperature under the hood will rise considerably. This has the effect of boiling or gassing the fuel contained in the accelerator pump reservoir, resulting in ineffective operation when the pump is next used. Also the fuel vapour created in the pump would seep into the system and so richen the idle air/fuel mixture by discharging fuel from the pump jet. The back bleed overcomes this condition by allowing vapour to bleed back into the float chamber and so allowing cooler fuel to feed into the pump.

Vacuum Break Air Hole

During normal operation the air speed and therefore the vacuum at the fuel outlet is high. This vacuum during high speed operation would be strong enough to pull fuel through the accelerator pump system. The vacuum break air hole "D" in Fig.18, is included to overcome this condition by allowing air to bleed into the pump outlet pipe and so lowering the vacuum created at the accelerator pump jet. Note that the bleed hole is located on the outlet side of the pump jet.

PRINCIPLE OF OPERATION (cont'd)

FORD V.V. CARBURETTOR

h) Choke Operation

Due to the variable venturi principle it is not practical to install a choke plate into the venturi. Therefore, all V.V. units irrespective of the vehicle model will have a fully automatic choke system.

The only similarity between the V.V. choke and fixed venturi auto-choke systems is the method of controlling the unit. This is achieved by using a conventional bi-metal coil which reacts to the temperature of the coolant supplied from the water pump via the inlet manifold.

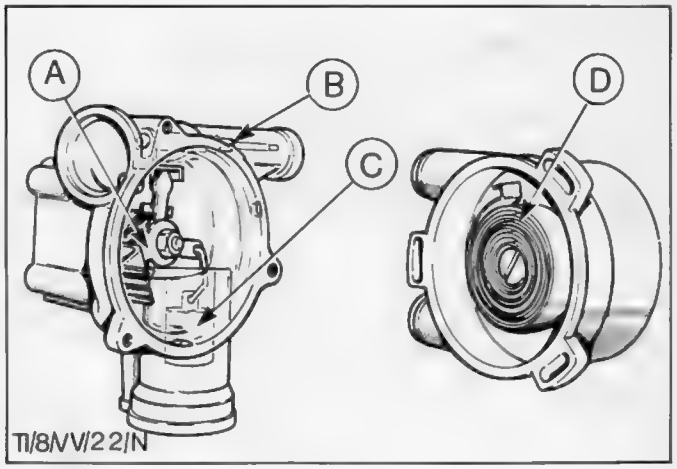


Fig.20. Auto-choke assembly.
A - Operating linkage
B - Needle valve
C - Pull down piston
D - Bi-metal coil

The actual choke system operates like a miniature carburettor utilising a variable needle jet and a variable air supply.

The system consists of a bi-metal coil, 'D' in Fig.20, a tapered needle valve 'B', operating linkage and a vacuum operated pull down piston 'C'. The principle of operation for the choke system is split into three parts; the fuel supply, the air supply and the choke pull down system.

1 - Choke Fuel Supply and Control

According to model, fuel supply to the choke is either sourced from the main pick up tube or from a separate choke supply tube. Fuel is then fed through internal galleries in the main jet body and into the tapered needle valve in the choke housing. Because the needle valve is tapered it has the ability to vary the fuel fed through the choke system to match the engine's requirements. On carburettors with a separate choke tube the fuel is partially emulsified at source by air being drawn into the upper section of the supply tube.
Fig.21, shown below also details the air/fuel mixing point, air intake and mixture outlet.

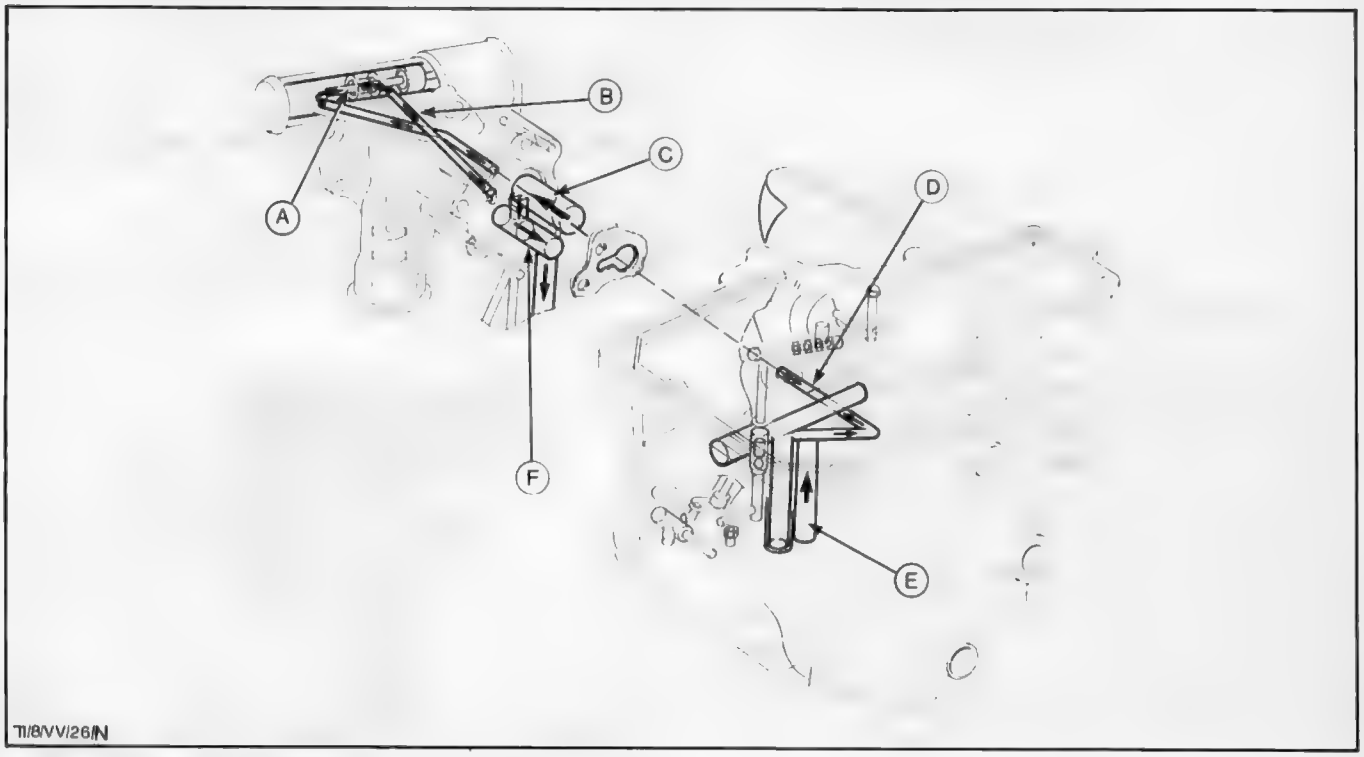


Fig.21. Auto-choke assembly.
A - Tapered needle valve
B - Fuel output gallery
C - Air intake and mixing point
D - Fuel supply gallery in main jet body
E - Choke fuel pick up tube
F - Mixture outlet

PRINCIPLE OF OPERATION (cont'd)

FORD V.V.
CARBURETTOR

Choke Fuel Supply and Control (cont'd)

On a cold engine the bi-metal coil will be fully contracted pulling the tapered needle out of the choke jet. This has the effect of opening the choke jet to give maximum fuel delivery. See Fig.22.

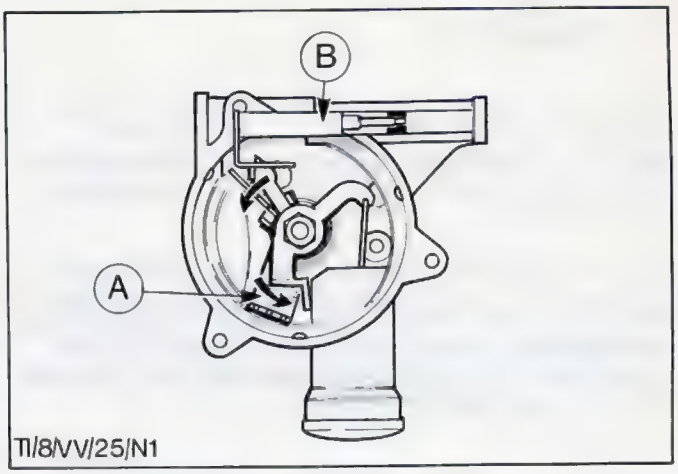


Fig.22. Auto choke fully operational.
A - Bi-metal lever
B - Needle valve fully open

As the bi-metal coil warms up it expands and closes the needle valve so reducing the amount of fuel fed into the sytem. This continues until the bi-metal coil fully closes the needle valve as shown in Fig.23.

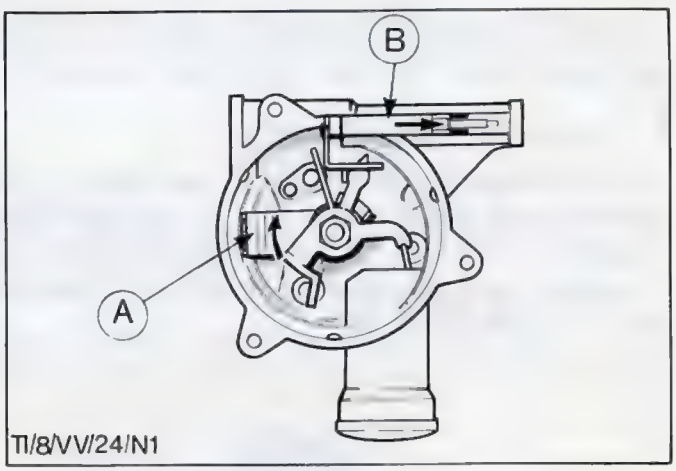


Fig.23. Auto-choke assembly closed down.
A - Bi-metal lever
B - Needle valve fully closed

2 - Choke Air Supply and Control

Cold engines require extra power to overcome friction, therefore extra air and fuel must be added. The choke air supply is sourced from a point in the venturi above the throttle plate, the air/fuel mixture is fed into the engine beneath the throttle plate, thus forming a throttle by-pass system. The choke air valve, Fig.24, is a brass sleeve attached to the central spindle of the choke levers. The sleeve has a hole drilled through the side wall which lines up with an outlet gallery, when the engine and therefore the bi-metal coil is cold. The choke fuel is added to the choke air supply before it enters the end of the sleeve and the resulting mixture is supplied to the engine below the throttle plate.

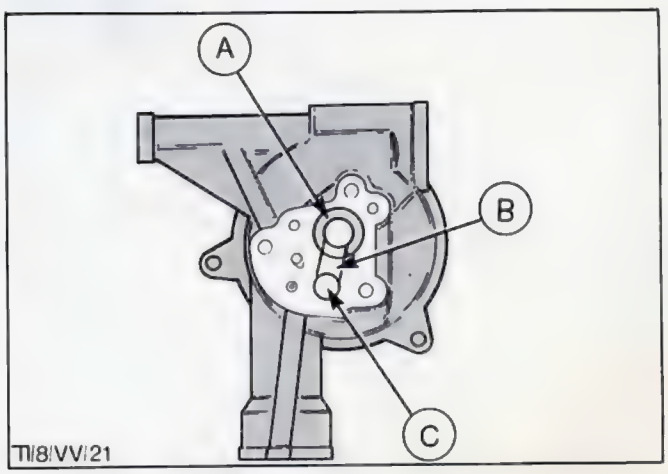


Fig.24. Air supply system in operation.
A - Brass sleeve attached to central shaft and lined up with outlet gallery
B - Outlet gallery
C - Air fuel outlet

PRINCIPLE OF OPERATION (cont'd)

Choke Air Supply and Control (cont'd)

As the bi-metal coil starts to heat up and expands it turns the central shaft and therefore the control sleeve thus restricting mixture flow through the system. As with the fuel supply the bi-metal expansion progressively rotates the sleeve until it fully blocks the outlet gallery. Refer Fig.25.

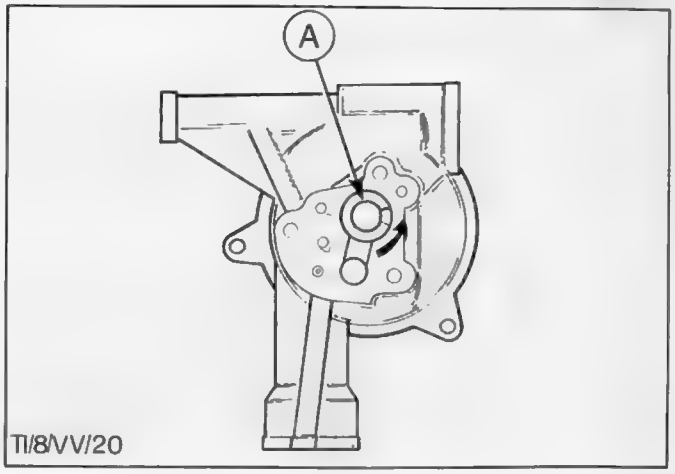


Fig.25. Air supply system closed down.
A - Brass sleeve blocking outlet gallery

3 - Choke Pull Down System Fig.26.

When operating a cold engine at a light load or cruise condition it is not necessary to have such a rich mixture as that required during acceleration or heavy load. The choke therefore has been equipped with a pull down system which pulls the choke off during engine cruise conditions. This system improves emission levels and fuel economy during engine warm up.
The system consists of a vacuum piston connected through levers to the central choke spindle. The piston is vacuum operated from a source in the venturi beneath the throttle plate. During acceleration when the throttle plate is open the vacuum signal beneath the plate and also at the pull down piston is low. Therefore, during acceleration the system has no effect on choke operation. As the cold engine returns to a steady state or idle condition the vacuum signal increases pulling the piston downwards. Once the torque of the bi-metal coil is overcome the piston will pull the needle valve closed and also close down the choke mixture supply.

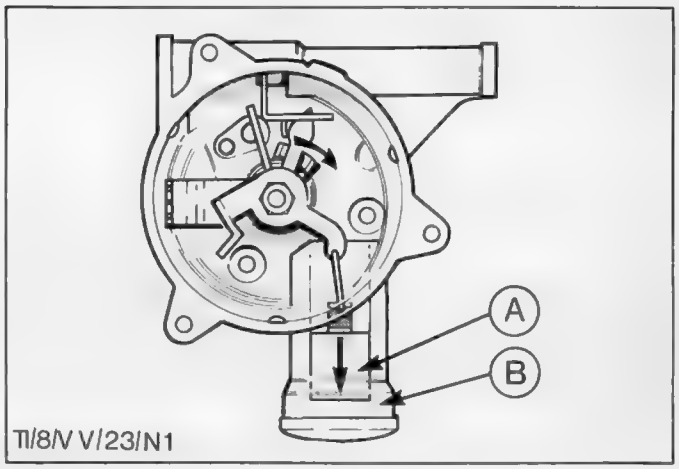


Fig.26. Choke pull down system.
A - Piston pulled down, closing choke
B - High vacuum

Working together the individual choke systems ensure that sufficient additional air/fuel mixture is supplied to the engine to suit the specific operating condition. Also, the system is designed to shut down progressively as the engine warms-up and thus avoids exessively high engine speeds normally associated with auto-choke systems.

PRINCIPLE OF OPERATION (cont'd)

FORD V.V. CARBURETTOR

j) Anti-Dieselling Valve

An anti-dieselling valve, similar to that used on some Ford fixed venturi units, is fitted on most V.V. carburettors. The purpose of the valve is to block the idle system when the ignition is turned OFF therefore preventing engine dieselling.

During normal operation of the vehicle a 7 volt supply is fed to the solenoid valve which holds back a plunger against a spring load. This allows air/fuel mixture to flow through the idle galleries, within the carburettor, in the normal way. When the ignition is switched OFF, the power supply to the valve is cut which allows the return spring to push the plunger into the end of the sonic discharge tube.

This results in the air/fuel mixture flow, in the sonic idle system, being blocked the instant the ignition is turned OFF and so preventing the engine from dieselling.

The tip of the plunger is 'Viton' coated to ensure a good seal is achieved between the plunger and sonic discharge tube.

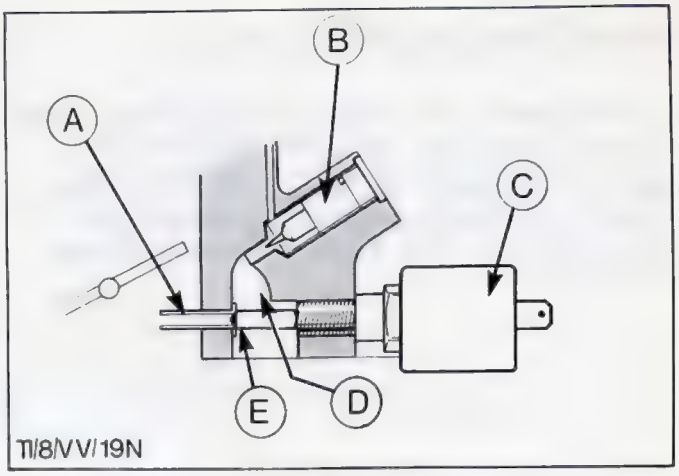


Fig.27. Anti-dieselling valve system.
A - Sonic discharge tube
B - Mixture screw
C - Anti-dieselling valve
D - By-pass air channel
E - 'Viton' coated tip

STARTING PROCEDURE

Engine - Cold: When starting engines equipped with fixed venturi carburettors, with automatic chokes, it is first necessary to operate the throttle to allow the choke plate/s to close. On engines equipped with variable venturi carburettors this starting procedure is not required because as an engine cools the V.V. choke will automatically function and will be fully operational on a cold engine. Full details of the choke system are shown in the Principle of Operation section.

Therefore, to start a cold engine equipped with a variable venturi carburetor all that is required is to crank the engine until it starts. It is important that during cranking the throttle is NOT pumped as this will upset the choke operation and cause a poor start condition.

If the engine does not start within ten seconds, return key to position 1, pause and repeat cranking. If the engine does not start after two attempts, wait ten seconds and proceed as described in "starting a flooded engine".

Engine - Warm: Slowly depress the throttle pedal to the half way position and hold, crank engine until it starts. If engine fails to start after three attempts and the engine is hot, proceed as described below.

Starting a Flooded Engine: If the engine has been cranked several times without starting, the cylinders may be flooded with unburnt fuel. Should this occur, press the throttle slowly to the floor and hold in this position while cranking the engine. When the engine starts release throttle gradually as the engine speed increases.

IMPORTANT NOTE: When the engine is first started from cold the fast idle speed will not be as high as that experienced on fixed choke carburettors. On initial start the engine will operate at approximately 900 rev/min, will increase to approximately 1200 during the first stages of warm up and finally drop to normal idle speeds when the engine reaches operating temperatures.

FUEL (PETROLEUM SPIRIT) HANDLING SAFETY PRECAUTIONS

FORD V.V.
CARBURETTOR

When carrying out repairs to vehicle fuel systems it is easy to become complacent about handling fuel, particularly in relation to draining fuel tanks. The risks involved should not be under estimated. The following information provides the basic precautions which must be taken if fuel is to be handled safely and also points out some other areas of risk that must not be overlooked.

1. Disconnect the battery when carrying out any work on fuel systems.

2. Always empty fuel tanks in the open, preferably in a designated no-smoking area. If this is not possible, portable warning notices should be positioned around the vehicle when carrying out the draining operation.

3. Always have a suitable fire extinguisher close at hand.

4. Empty the tank using suitable pumping equipment, not by disconnecting the fuel line from the sender unit.

5. Ensure there are no naked lights or other ignition sources (i.e. welding equipment) within 7 metres (20 feet) of the vehicle, before commencing the emptying process.

6. Do not empty the tank over an inspection pit. Petrol vapour is heavier than air and will remain in a pit for several hours. This also applies when cleaning carburettor float bowls or fuel pumps as small amounts of petrol can produce sufficient vapour to constitute a possible source of risk.

7. Empty the fuel into a closed, clearly marked container. There are containers on the market which are specifically suited to this purpose incorporating such devices as a flame arrestor and a pressure vented cap.

8. Having removed the fuel, do not leave it standing in the workshop. Petrol should only be kept in a store which meets with the approval of local by-laws.

9. When the fuel has been drained from the tank, the tank will still contain petrol vapour. In this state it is in an even more hazardous condition, and the precautions regarding naked lights and other ignition sources should be maintained with the utmost care.

10. On many vehicles the fuel line is connected to the fuel tank outlet pipe by spring steel band clips to ensure a leak proof joint. These clips should be released before the fuel line is disconnected or the tank sender unit is removed. By observing this procedure, any sparks which may be generated when removing the clips cannot ignite residual petrol fumes in the fuel tank.

11. In no circumstances should any repair involving the application of heat be attempted on any fuel tank, without first rendering the tank safe. There are two main methods of rendering the tank safe:

    (a) Steaming Out.

    The filler cap and the tank sender unit must be removed and the tank emptied as completely as possible before steaming out. The tank should then be steamed for at least two hours with low pressure steam. Position the tank so that the condensate can drain away freely, thus ensuring that sediment and sludge, not volatilised by the steam, are washed out during the steaming process.

    (b) Boiling Out

    Again the filler cap and the tank sender unit must be removed and the tank emptied. Immerse the tank completely in boiling water containing an effective alkaline degreasing agent or a detergent, with the water filling as well as surrounding the tank. Boil the tank for at least two hours.

    In addition, no person should be allowed to work on petrol or any fuel tank repairs without having the special training necessary.

12. As an added precaution fuel tanks should have a PETROL (GASOLINE) VAPOUR warning label attached to them as soon as they are removed from the vehicle. After steaming or boiling out a signed and dated label to this effect should be attached to the tank.

SERVICE ADJUSTMENTS AND CHECKS

FORD V.V. CARBURETTOR

In total there are five adjustments possible on the V.V. carburettor, however only two are required during normal routine servicing. These are the idle speed and fuel mixture settings. The three other adjustments will only be required when the choke is repaired or when the carburettor is overhauled. They are fully explained in Operation No. 23 214 'Metering rod adjust' and Operation No. 23 274 'Choke adjust'.

Idle speed adjustment is achieved by exactly the same method as that used on the Ford fixed venturi unit, utilising a throttle stop screw Fig.28, to control engine speed and a mixture screw Fig.29, to control fuel delivery.

On all V.V. units the mixture screw will be tamperproofed to minimise indiscriminate adjustment of the idle mixture. The screw is sealed by a plastic plug which has to be destroyed to gain access to the screw.

Adjustment of the throttle stop screw controls the engine's idle speed by opening the throttle plate, to increase speed, or closing the plate to reduce speed. Refer Fig.28.

The mixture screw is a tapered needle jet which when screwed in will reduce the flow of fuel through the system and so weaken the mixture. Unscrewing will have the opposite effect which richens the idle mixture. Refer Fig.29.

A full detailed procedure for adjusting the idle speed and mixture setting is covered in Operation No. 23 213. Both adjustment screws are shown in Fig.30.

In addition to the idle adjustment during normal routine servicing the entire fuel system should be checked for evidence of leaks. If any are found they should be rectified immediately.

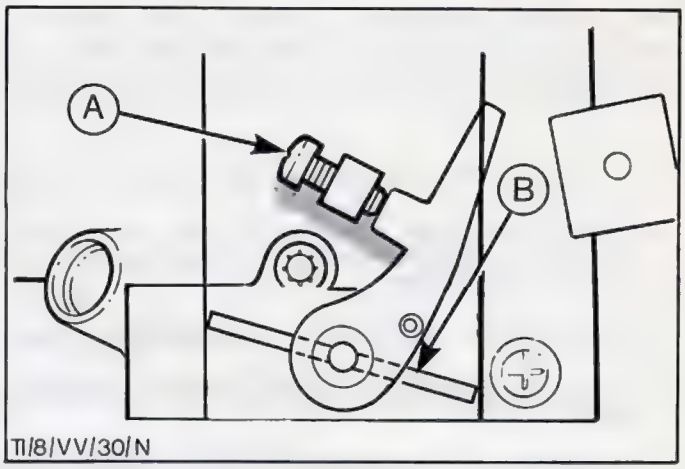


Fig.28. Engine idle speed adjustment.
A - Throttle stop screw
B - Throttle plate

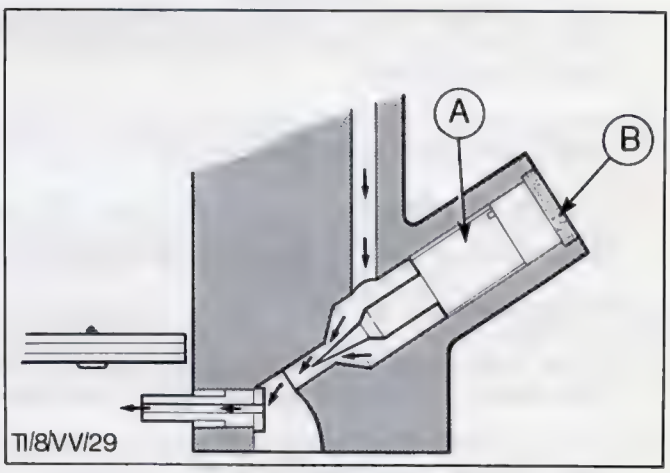


Fig.29. Fuel mixture or CO adjustment.
A - Mixture screw
B - Tamperproof plug

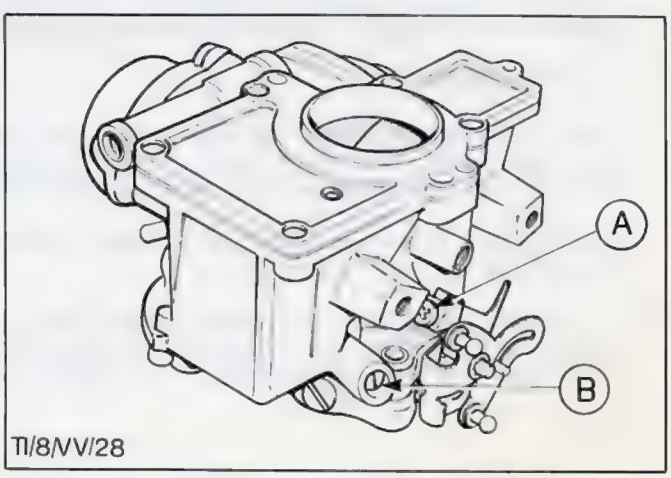


Fig.30. Variable Venturi carburettor.
A - Idle speed adjusting screw
B - Mixture adjusting screw (Tamper-proof plug removed for clarity)

SPECIAL SERVICE EQUIPMENT RECOGNITION

FORD V.V.
CARBURETTOR

To carry out adjustments on variable venturi carburettors two separate pieces of equipment are required. These are:

a) Engine Tachometer Fig.31.

The tachometer is required for checking normal idle speeds and in most cases will be readily available in the workshop.

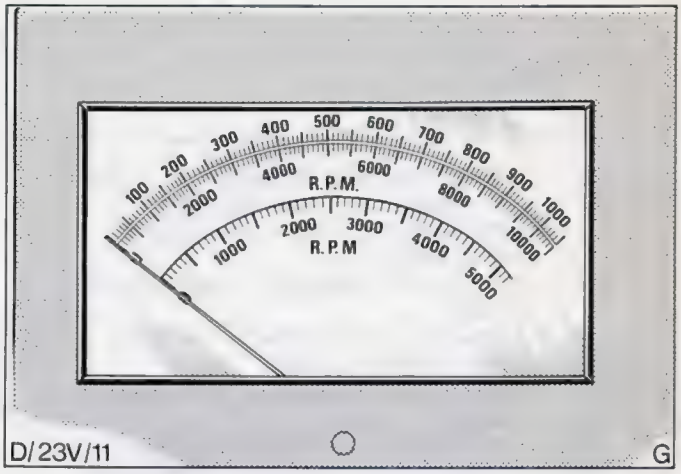


Fig.31. Typical engine tachometer or rpm meter.

b) Exhaust Gas Analyser Fig.32.

This equipment is used to check the mixture strength at normal idle during routine servicing. To ensure that the carburettor is adjusted correctly the equipment must be calibrated in % CO rather than the rich and lean calibrations which were used on older gas analysing equipment.

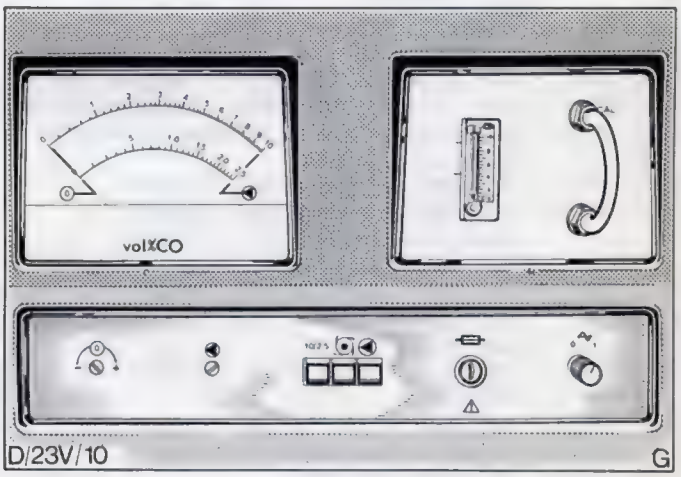


Fig.32. Exhaust gas analyser calibrated in %CO.

SERVICE AND REPAIR OPERATIONS - CONTENT

FORD V.V.
CARBURETTOR

FUEL SYSTEM		Described in this publication	Contained in Operation	Contained in Section 23
23 122	Fuel system and carburettor - clean		23 212	X
23 172	Air cleaner - check operation (thermostatically - controlled units only)	X		
23 174	Air cleaner assembly - remove and install	X		
23 184	Element - air cleaner - replace	X		
23 212	Carburettor - clean	X		
23 213	Engine idle speed and fuel mixture - adjust	X		
23 224	Carburettor - remove and install	X		
23 224 6	Carburettor - clean - inspect and adjust (carburettor removed)	X		
23 242	Carburettor - main metering rod - replace	X		
23 244	Needle valve - replace	X		
23 264	Carburettor control diaphragm - remove and install	X		
23 274	Automatic choke - adjust	X		
23 276	Automatic choke - remove and install	X		
23 283	Hose - automatic choke - replace (one)			X
23 284	Hose - automatic choke - replace (both)			X
23 531	Fuel pump delivery pressure - check			X
23 532	Fuel pump - clean			X
23 534	Fuel pump - remove and install			X
23 534 4	Fuel pump - remove and install (engine removed)			X
23 552 2	Fuel tank - clean (fuel tank removed)			X
23 554	Fuel tank - remove and install			X
23 558	Ventilation tube - fuel tank - remove and install			X
23 572	Fuel tank filler pipe - remove and - install			X
23 572 4	Fuel tank filler pipe - remove and - install (fuel tank removed)		23 572	
23 581 2	Fuel line - clean			X
23 583	Fuel line - fuel tank to pump - remove and install			X
23 587	Fuel line - fuel pump to carburettor - remove and install			X
23 594	Fuel line - fuel return - carburettor to fuel tank - remove and install			X
23 598	Hose - fuel line connecting - replace (one)			X
23 811	Linkage - accelerator - adjust	X		
23 822	Pedal - accelerator - remove and install			X
23 824	Accelerator shaft - remove and install			X
23 826	Cable - accelerator - remove and install			X

23 172 AIR CLEANER - CHECK OPERATION (Thermostatically Controlled Units Only)

SPECIAL EQUIPMENT REQUIRED:
Vacuum Pump

1. Open hood and fit fender covers.

2. Note position of air cleaner flap. With engine stationary the flap should be fully closed, Fig.33.

NOTE: Flap position can be viewed through the main intake spout.

3. Start engine and note operation of air control flap. At idle flap should fully open and hold open to allow warm air from exhaust manifold to enter air cleaner. Fig.34.

NOTE: It is essential that this test is carried out on a cold engine, i.e. with engine cooled sufficiently for the ambient temperature around the exhaust manifold to be below heat sensor value (25° C) (77° F). This is to ensure that the heat sensor unit allows full vacuum to be available at the diaphragm unit. If the flap operates as described above, cleaner is functioning correctly.

If flap remains closed when engine is started the diaphragm unit and heat sensor unit should be tested as follows to determine which unit is faulty.

4. Check vacuum lines for leaks and renew if suspect.

5. Disconnect diaphragm to heat sensor pipe at the heat sensor and connect vacuum pump to diaphragm, Fig.35.

6. Pump vacuum up to 100 mm (14 in) of mercury and hold. If diaphragm now operates and control flap opens this indicates that heat sensor is at fault and should be renewed.

If flap remains closed throughout this test, either diaphragm or control flap is faulty. If visual inspection confirms that control flap is free to operate then a fault in the diaphragm is indicated and this should be renewed.

IMPORTANT NOTE: When installing an air cleaner, ensure that the vacuum pipe fully locates onto inlet manifold take off pipe.

7. Disconnect vacuum pump and reconnect pipe.

8. Remove fender covers and close hood.

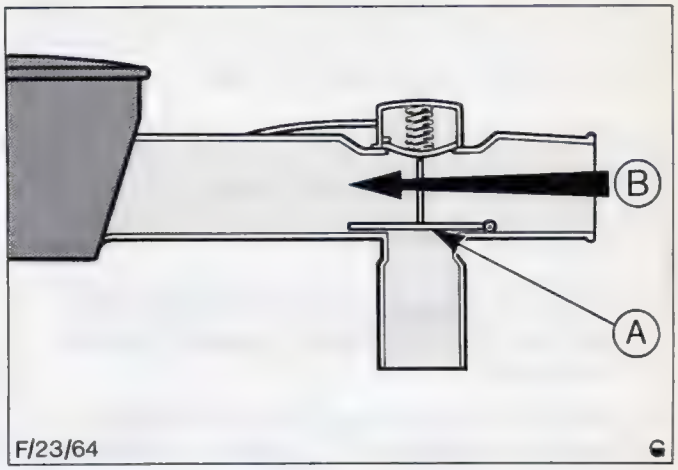


Fig.33. Air cleaner spout.
A - Control flap shutting of flow from manifold
B - Main air flow

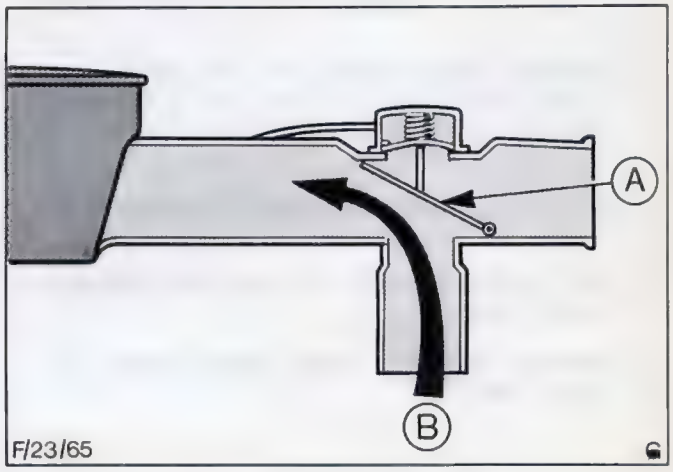


Fig.34. Air cleaner spout.
A - Control flap held open restricting main air flow
B - Air flow from manifold

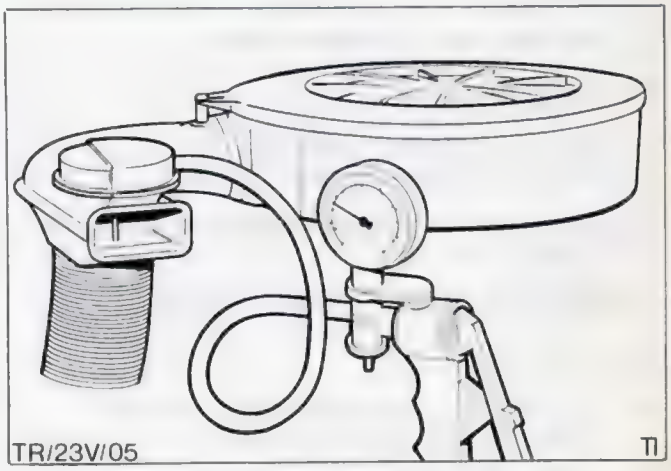


Fig.35. Hand vacuum pump connected to diaphragm.

23 174 AIR CLEANER ASSEMBLY - REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove one bolt and loosen securing clamp, Fig.36, disconnect cleaner to manifold air hose and lift air cleaner assembly clear of carburettor.
4. Disconnect vacuum supply pipe at inlet manifold and detach air cleaner assembly.
5. Remove air cleaner element. Detailed in Operation No. 23 184.

To Install

6. Refit element to air cleaner body and secure lid.
7. Reconnect vacuum supply pipe to manifold connection, Fig.37, and position cleaner ensuring air hose connects correctly on manifold location.
8. Refit and secure air cleaner securing bolt and clamp.
9. Check vacuum pipe and air hose for correct installation.
10. Reconnect battery, remove fender covers and close hood.

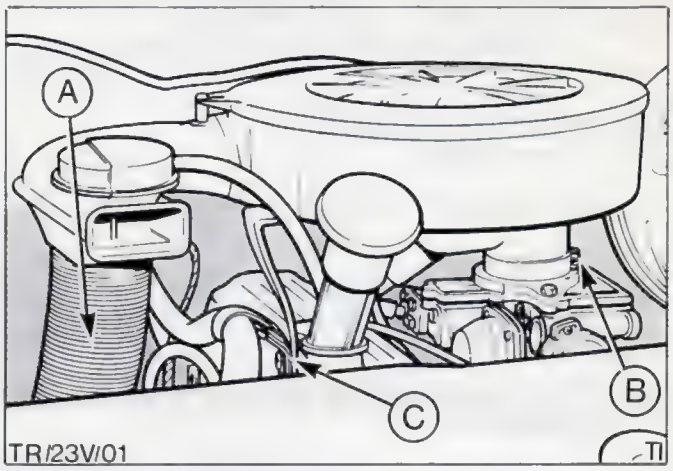


Fig.36. Air cleaner assembly.
A - Cleaner to manifold air hose
B - Cleaner to carburettor clamp
C - Cleaner securing bolt

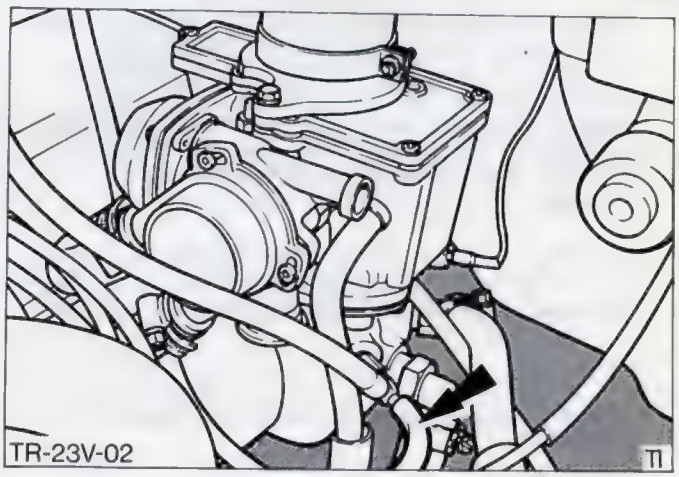


Fig.37. Air cleaner vacuum supply hose connection.

23 184 ELEMENT - AIR CLEANER - REPLACE

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove air cleaner assembly. Detailed in Operation No. 23 174.
4. Remove four cross head screws and detach air cleaner lid.
5. Remove air cleaner element, Fig.38.

To Install

6. Place element into position, locate air cleaner lid and secure screws.
7. Refit air cleaner assembly.
8. Reconnect battery.
9. Remove fender covers and close hood.

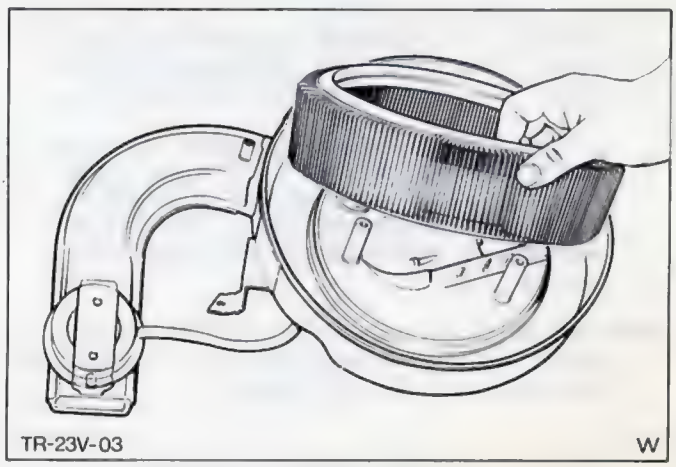


Fig.38. Air cleaner element removal.

23 212 CARBURETTOR - CLEAN

SPECIAL EQUIPMENT REQUIRED:

CO Meter
RPM Meter

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove air cleaner assembly, Fig.39. Detailed in Operation No. 23 174.
4. Clean carburettor exterior.
5. Remove two bolts and detach carburettor to air cleaner mounting adaptor, Fig.40.
6. Remove seven screws and detach carburettor top cover, Fig.40.
7. Using a piece of absorbent cloth soak out fuel from float chamber.
8. Using an air line, clean carburettor float chamber.

IMPORTANT: Ensure air pressure is NOT directed into accelerator pump air bleed, air valve vent or pump outlet, Fig.41, as this will result in diaphragm damage.

9. Position upper gasket and top cover and secure.
10. Position and secure air cleaner to carburettor mounting adaptor.
11. Refit air cleaner assembly.
12. Reconnect battery.
13. Check and adjust engine idle speed and fuel mixture setting. Detailed in Operation No. 23 213.
14. Remove fender covers and close hood.

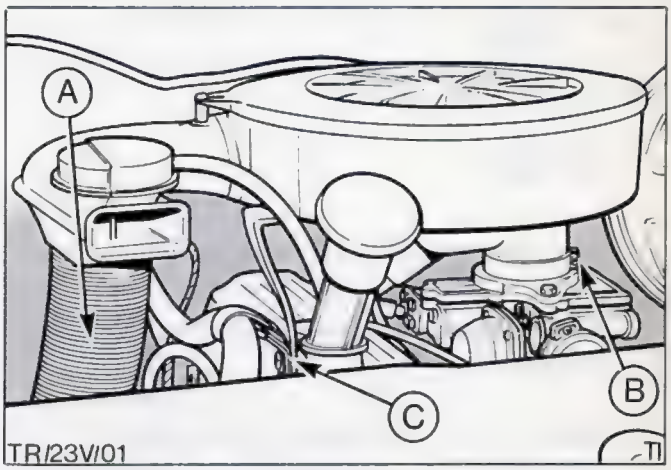


Fig.39. Air cleaner assembly.
A - Cleaner to manifold air hose
B - Air cleaner to carburettor clamp
C - Air cleaner securing bolt

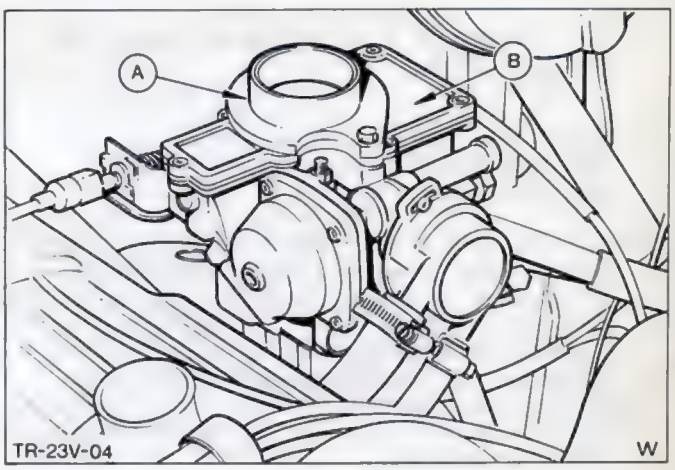


Fig.40. Air cleaner mounting adaptor removal.
A - Air cleaner adaptor
B - Carburettor top cover

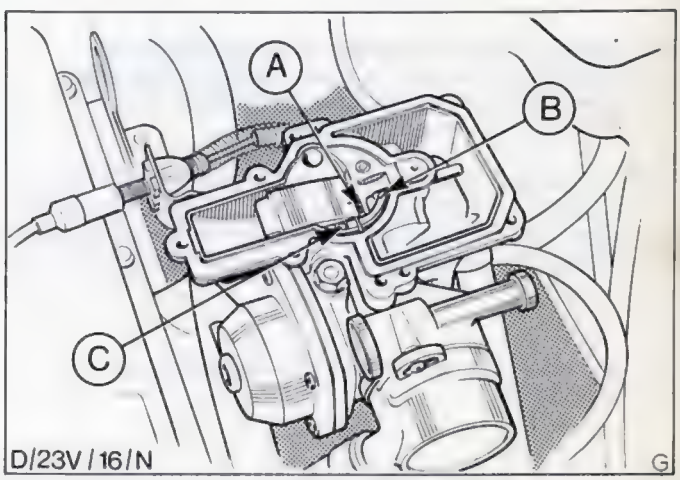


Fig.41. V.V. carburettor with top cover removed.
A - Accelerator pump outlet
B - Accelerator pump air bleed
C - Air valve diaphragm vent

23 213 ENGINE IDLE SPEED AND FUEL MIXTURE - ADJUST

SPECIAL EQUIPMENT REQUIRED:

CO Meter
RPM Meter

1. Open hood and fit fender covers.

2. Warm up engine to normal operating temperature.

3. Connect CO and RPM meters to engine in accordance with manufacturer's instructions.

4. Stabilise engine by running at 3,000 rpm for approximately 30 seconds and allow engine to idle.

5. Wait for meters to stabilise and record %CO and idle speed.

6. Adjust idle speed screw to achieve correct idle rpm, Fig.42. Refer Technical Data section.

NOTE To visually locate adjusting screws it will be necessary to use a mirror, carburettors illustrated in Figs, 42 and 43 are viewed from the rear. Also on these carburettors it will be found that during routine maintenance no adjustment of the mixture (CO level) will normally be required. However, if CO level is found to be incorrect the following procedure should be adopted.

7. Using a thin bladed screwdriver carefully prise out mixture screw tamper-proof plug, Fig.43.

8. Stabilise engine speed as detailed in sub-operation four and adjust mixture screw and idle speed screw to give specified %CO at correct idle speed, Fig.44.

NOTE: Adjustment must be carried out within 10 to 30 seconds from the time meters stabilise. If time taken to adjust is longer than 30 seconds accelerate engine again to 3,000 rpm for 30 seconds and recheck.

9. Recheck idle speed and %CO and readjust as necessary.

10. Fit new tamper-proof plug to mixture screw housing.

11. Remove fender covers and close hood.

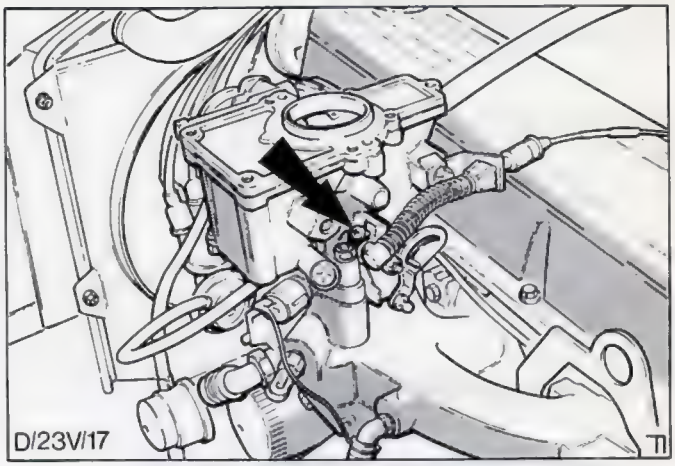


Fig.42. Variable Venturi carburettor, idle speed adjusting screw.
(Air cleaner removed for clarity but must be fitted during idle adjustment)

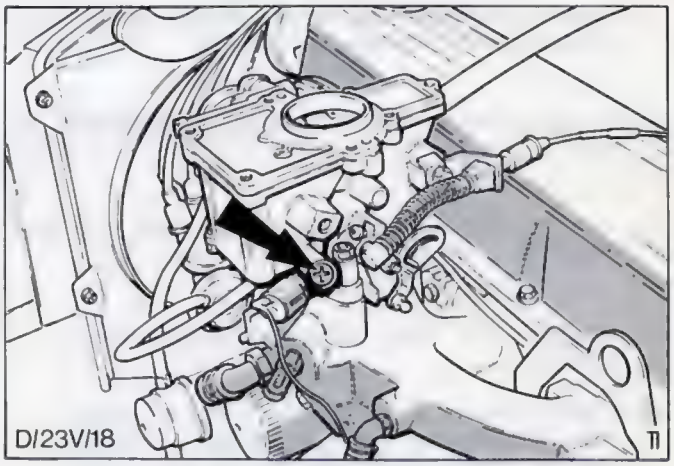


Fig.43. Mixture screw tamper-proof plug.
(Air cleaner removed for clarity)

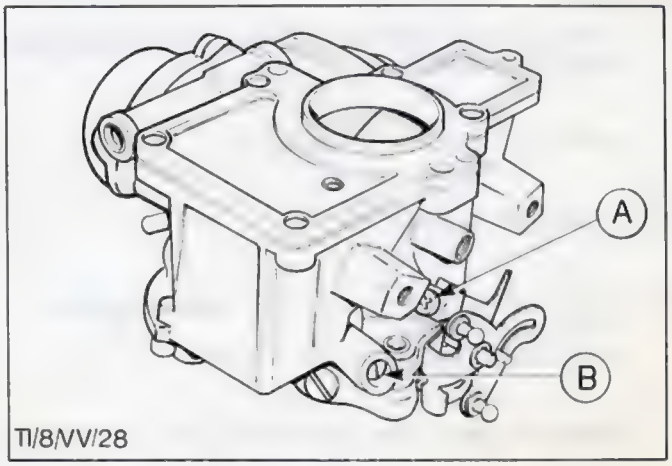


Fig.44. Idle adjusting screws.
A - Idle speed adjusting screw
B - Idle mixture adjusting screw

23 224 CARBURETTOR - REMOVE AND INSTALL

SPECIAL EQUIPMENT REQUIRED:

CO Meter
RPM Meter

To Remove

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove air cleaner assembly.
   Detailed in Operation No. 23 174.
4. Disconnect both auto-choke hoses at carburettor. 'B' in Fig.45.

IMPORTANT: Before disconnecting hoses ensure that cooling system is not pressurized (by removing radiator cap and refitting) and that radiator cap is in position.
Position disconnected hoses with ends facing upwards, this will minimise amount of coolant lost.

5. Disconnect anti-dieselling valve wire.
6. Disconnect carburettor to distributor vacuum pipe.
7. Disconnect throttle linkage.
8. Disconnect fuel feed pipe at carburettor.

IMPORTANT: If a crimped type hose clamp is fitted it must be cut free and replaced with a screw and nut type clamp, Fig.46.

9. Remove two nuts and washers and detach carburettor assembly, Fig.47.

To Install

10. Transfer air cleaner mounting adaptor to new carburettor and clean gasket faces.
11. Place carburettor into position with a new gasket and secure.
12. Reconnect distributor vacuum supply pipe.
13. Reconnect fuel feed pipe.
    Refer Fig.46 and sub-operation eight.
14. Reconnect throttle linkage.
15. Reconnect anti-dieselling valve.
16. Reconnect both auto-choke hoses.
17. Refit air cleaner assembly, top up cooling system if required and reconnect battery.
18. Check and adjust engine idle speed and fuel mixture setting.
    Detailed in Operation No. 23 213.
19. Remove fender covers and close hood.

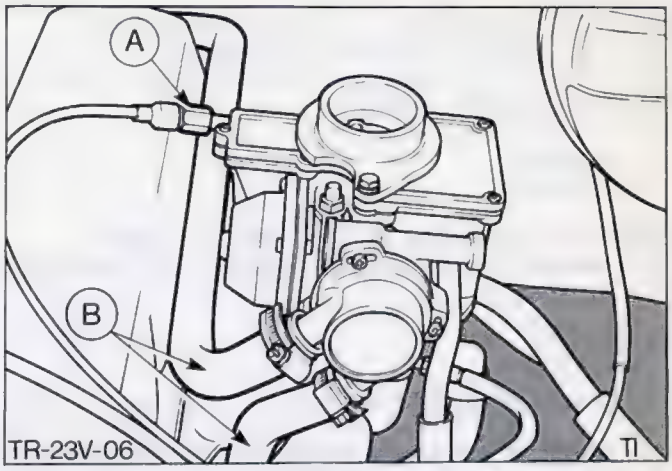


Fig.45. Components to be disconnected before removing carburettor.
A - Throttle linkage
B - Choke hoses

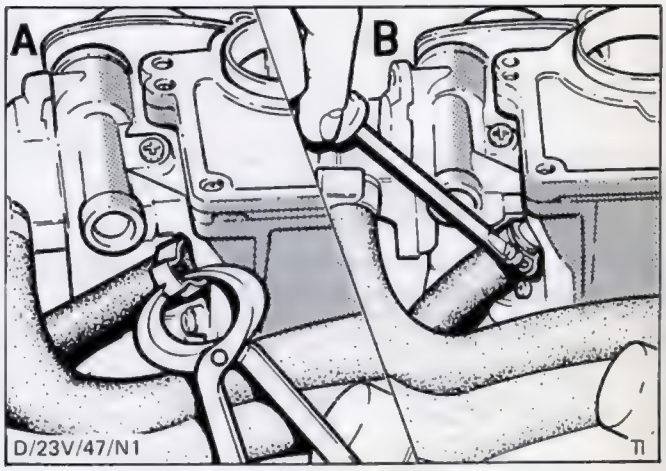


Fig.46. Disconnecting and reconnecting fuel supply pipe.
A - Crimped type hose clamp
B - Screw and nut type hose clamp

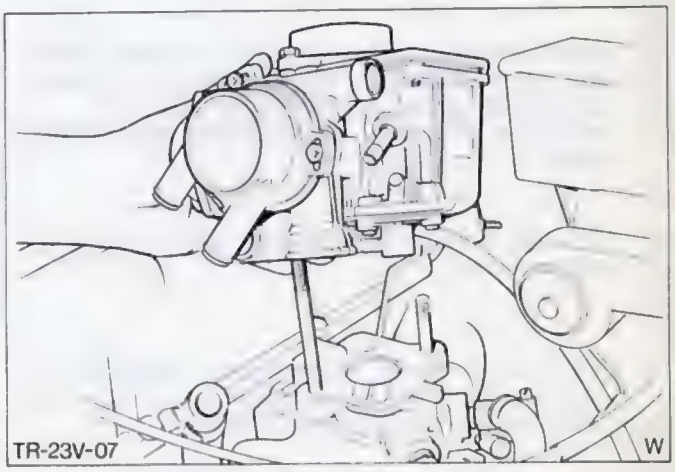


Fig.47. Carburettor removal.

23 224 6 CARBURETTOR - CLEAN, INSPECT AND ADJUST (Carburettor removed)

SPECIAL EQUIPMENT REQUIRED:

CO Meter
RPM Meter

NOTE: This equipment is only required after carburettor has been overhauled and refitted to vehicle.

1. Clean carburettor exterior.
2. Remove seven screws and detach carburettor top cover and gasket, Fig.48.
3. If required drain fuel float chamber.

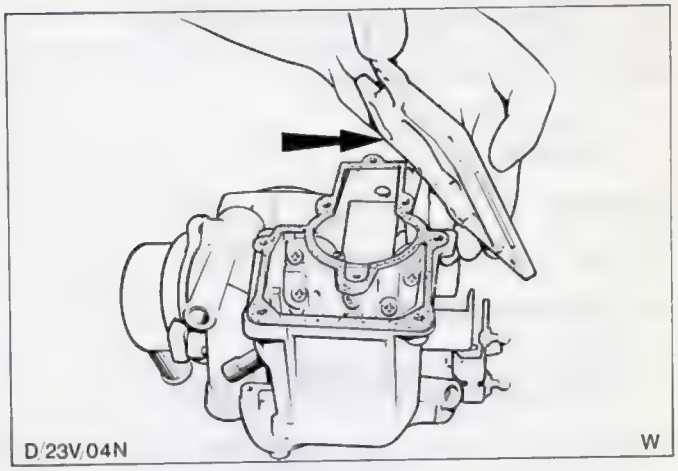


Fig.48. Carburettor top cover removal.

4. Remove four cross head screws, hold air valve fully open and carefully detach main jet body. Refer Fig.49.

NOTE: Do not remove metering rod unless inspection proves rod is worn or damaged.

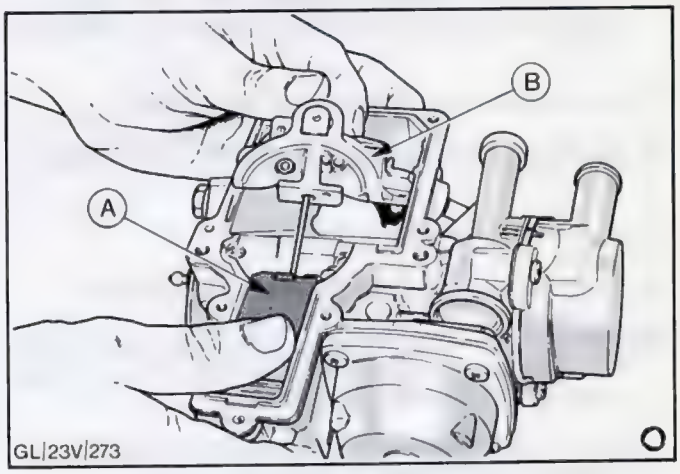


Fig.49. Main jet body removal.
A - Air valve held fully open
B - Main jet body

5. Remove accelerator pump outlet one-way valve ball and weight. To remove carefully invert carburettor main body to allow ball and weight to drop out. Accelerator pump outlet shown in Fig.50.
6. Lift out float, float spindle and intake needle valve.
7. Using a thin bladed screwdriver carefully prise out mixture screw tamper-proof plug and detach mixture adjustment screw.

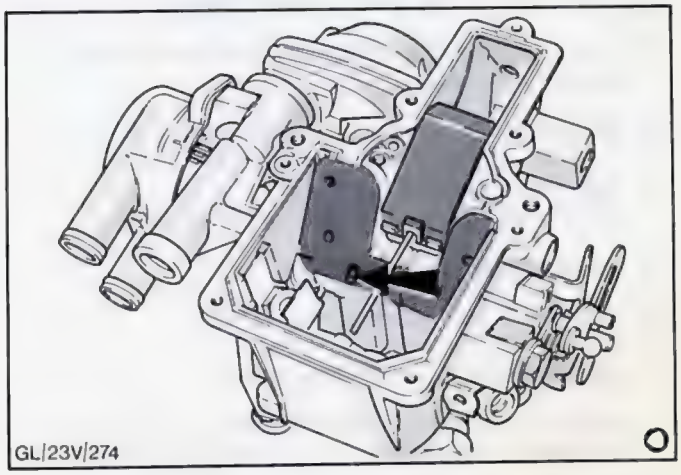


Fig.50. Accelerator pump outlet.

8. Remove four cross head screws and detach vacuum diaphragm housing, return spring and spring seat. Remove circlip and detach diaphragm, Fig.51.
Take care return spring or circlip is not lost.

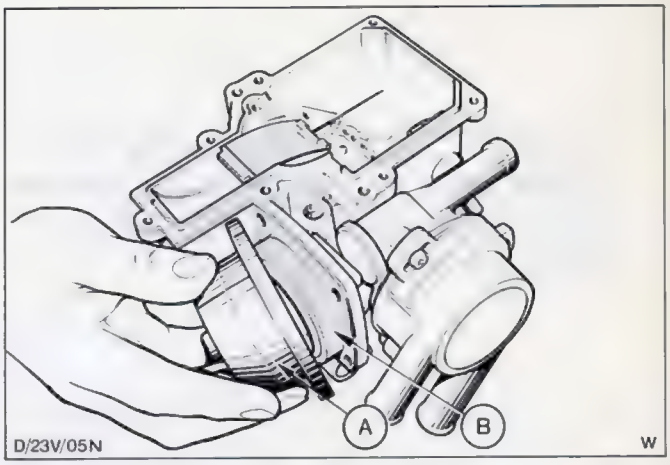


Fig.51. Vacuum diaphragm removal.
A - Housing
B - Vacuum diaphragm

9. Invert carburettor, remove three cross head screws and detach accelerator pump diaphragm, also taking care return spring is not lost, Fig.52.

10. Clean carburettor float chamber, main jet body and jet drillings.

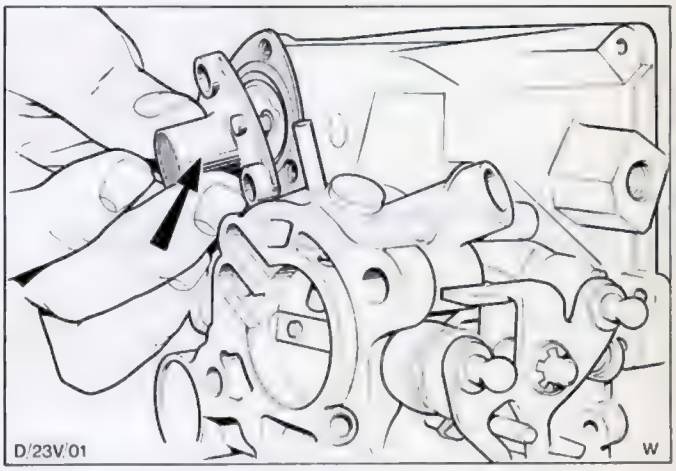


Fig.52. Accelerator pump housing removal.

11. Inspect carburettor components.
Some of the items for inspection are shown in Fig.53.
Float should be checked for leaks, diaphragm and gasket checked for splitting and metering rod, needle valve and jet body checked for wear or damage.

NOTE: Ensure main jet in the main jet body is closely checked for wear, e.g. Ovality.

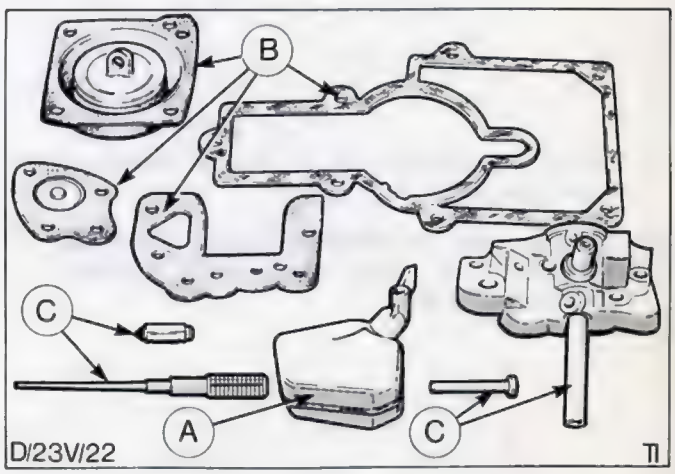


Fig.53. Carburettor components to be checked.
A - Checked for leaks
B - Checked for splits
C - Checked for wear or damage

12. Check carburettor main body and remaining components for wear or damage, Fig.54. The main points for checking are air valve and its associated linkage, throttle plate, spindle and throttle linkage, and two diaphragm return springs.

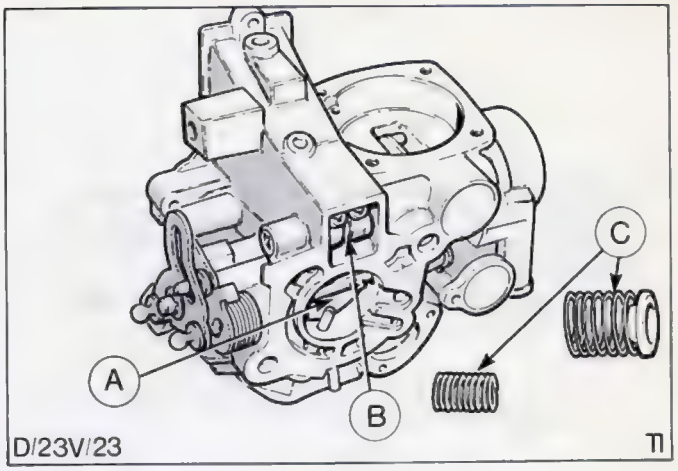


Fig.54. Items to be checked on carburettor main body.
A - Throttle spindle and linkage
B - Air valve and associated linkage
C - Diaphragm return springs

13. Ensure that metering rod bias spring is correctly installed to air valve, Fig.55.

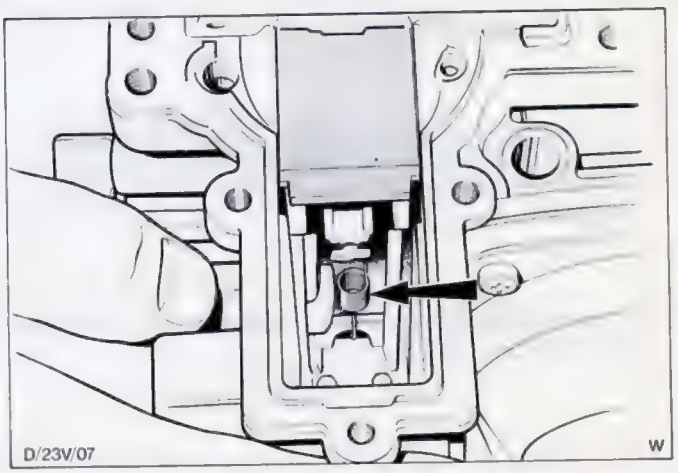


Fig.55. Metering rod bias spring correctly positioned on air valve.

14. Refit accelerator pump diaphragm assembly in the order shown in Fig.56.

NOTE: Gasket side of diaphragm should face pump housing. Also ensure diaphragm lies flat and is not kinked.

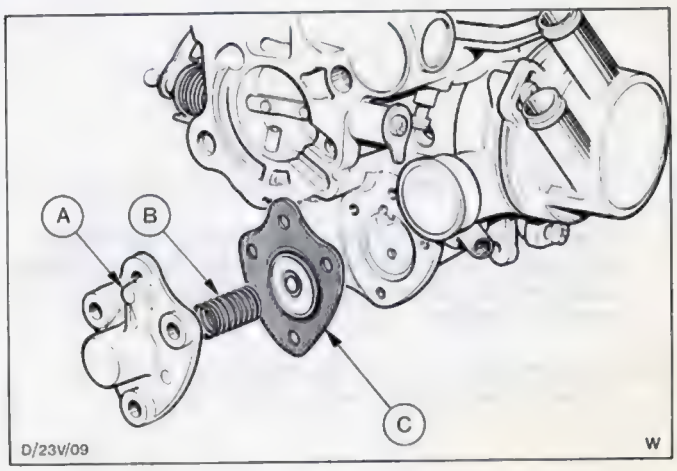


Fig.56. Accelerator pump assembly.
A - Housing
B - Return spring
C - Diaphragm

15. Connect control diaphragm to operating linkage, reconnect circlip and refit diaphragm housing and spring assembly, Fig.57. Secure with four cross head screws.

NOTE: Ensure that vacuum hole in diaphragm aligns with supply gallery in both carburettor body, 'D' in Fig.57, and housing. Also ensure diaphragm lies flat and is not kinked, by holding air valve open whilst locating and tightening diaphragm cover.

16. Refit mixture adjusting screw, fully screw in and screw out three full turns. This will position screw in the approximate idle running location.

NOTE: When fitting mixture screw do not overtighten as this can cause damage to the finely machined surfaces.

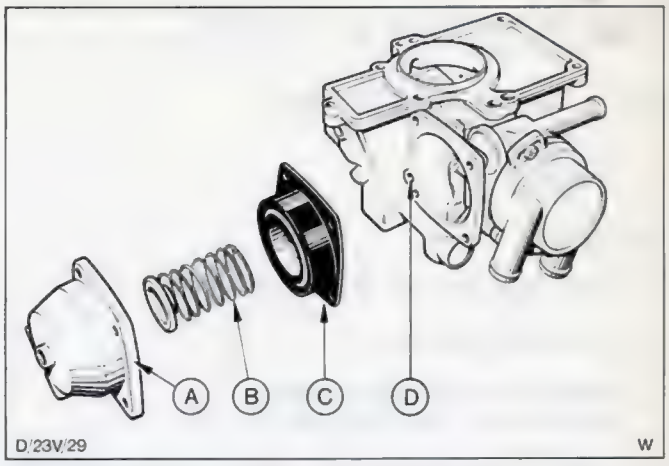


Fig.57. Control vacuum diaphragm assembly.
A - Diaphragm housing
B - Return spring
C - Diaphragm
D - Vacuum supply gallery

17. Refit needle valve, float and float pin.

NOTE: Refit needle valve so that spring loaded ball on valve will be in contact with float once petrol is fed into carburettor, Fig.58.

18. Refit accelerator pump ball and weight into discharge passage.

NOTE: Fit ball first and then position weight on top. Fig.58, shows location of discharge passage.

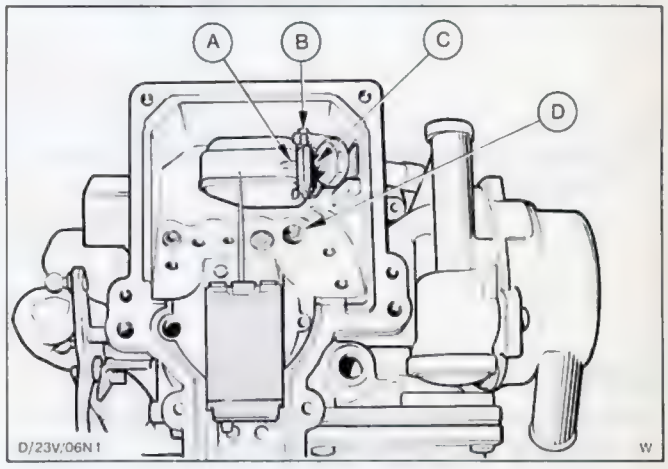


Fig.58. Needle valve installation.
A - Float
B - Float pin
C - Needle valve
D - Accelerator pump discharge passage

19. Hold air valve fully open and using a new gasket carefully position and loosely secure main jet body.

Using a straight edge adjust main jet body so that two alignment flanges 'A' in Fig.59, are flush with top face of carburettor main body.

20. Adjust main metering rod as detailed in Operation No. 23 242 shown on the following page.

NOTE: Only carry out this operation if rod adjustment is suspect.

21. Using a new gasket refit carburettor top cover.

Once carburettor has been installed to vehicle engine idle speed and mixture adjustment must be carried out.

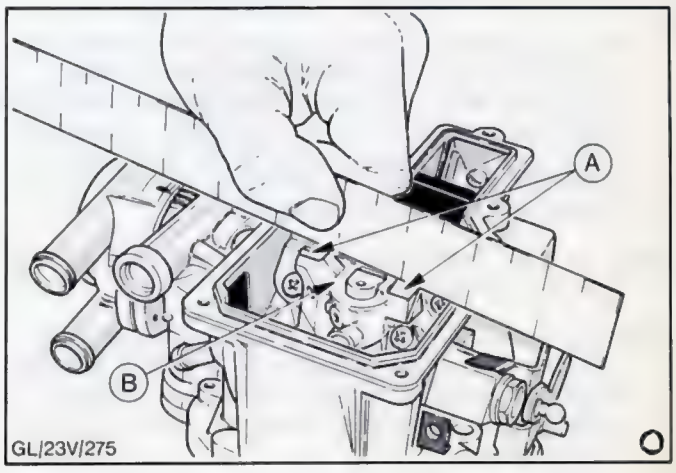


Fig.59. Main jet body adjustment.
A - Alignment flanges
B - Main jet body

23 242 MAIN METERING ROD - REPLACE

SPECIAL SERVICE TOOLS REQUIRED:

CO Meter
RPM Meter

To Remove

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove air cleaner assembly. Detailed in Operation No. 23 174.
4. Remove seven screws and detach carburettor top cover.
5. From inside carburettor tap out metering rod tamper-proof plug.
6. Unclip metering rod bias spring, Fig.60.
7. Unscrew and carefully detach main metering rod, Fig.61.

To Install

8. Very carefully slide new metering rod into position and screw in a few turns.
9. Clip metering rod bias spring into position as shown in Fig.60.
10. Adjust main metering rod as follows.

    Hold air valve partially open and position a 0,03mm (0,001in) feeler blade between air valve and main jet body. Release air valve to trap feeler blade in this position. Locate a thin bladed screwdriver as shown in Fig.62, and carefully screw in metering rod until air valve just releases feeler blade.

NOTE: At this point rod would have bottomed in its jet and started to open the air valve.

IMPORTANT NOTE: When carrying out this operation extreme care must be taken as metering rod can easily bind in main jet. Therefore during adjustment continually open air valve to stop rod binding.

From this point unscrew metering rod the exact amount of turns as detailed in the Technical Data section.

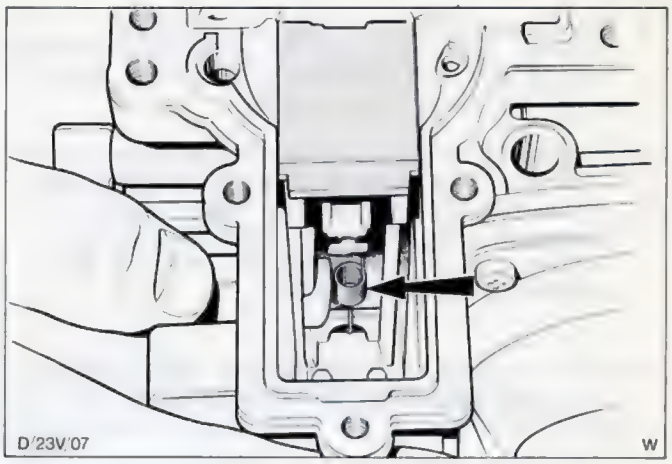


Fig.60. Metering rod bias spring fitted to air valve.

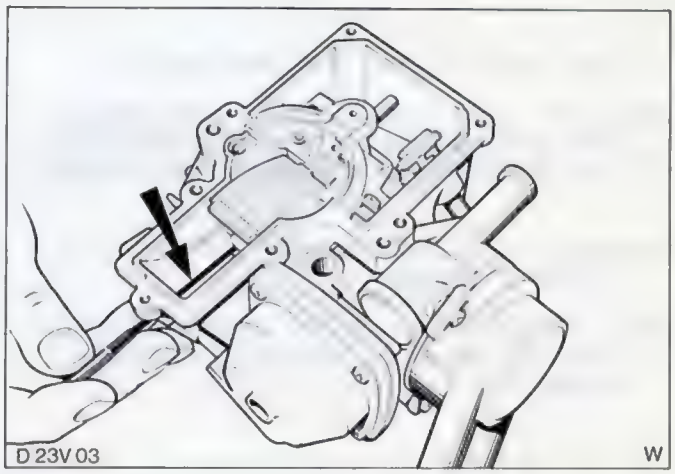


Fig.61. Main metering rod removal.

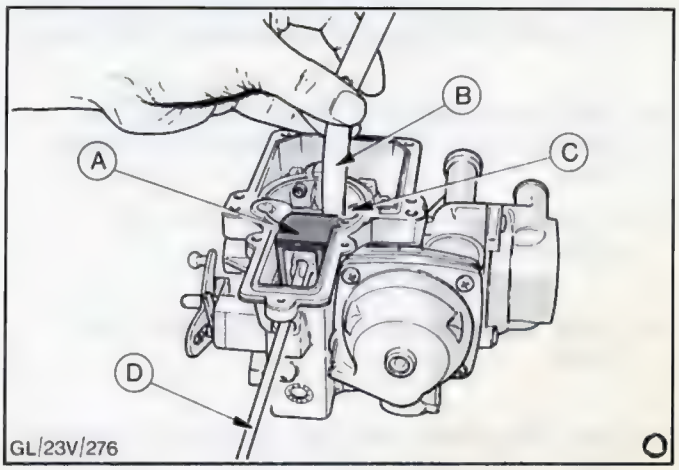


Fig.62. Main metering rod adjustment.
A - Air valve
B - Feeler blade
C - Main jet body
D - Screwdriver

11. Fit new tamper-proof plug in hole in venturi through which metering rod was installed. Refer Fig.63.

12. Using a new gasket refit carburettor top cover.

13. Refit air cleaner assembly.

14. Reconnect battery.

15. Check and adjust engine idle speed and fuel mixture setting.
Detailed in Operation No 23 213.

16. Remove fender covers and close hood.

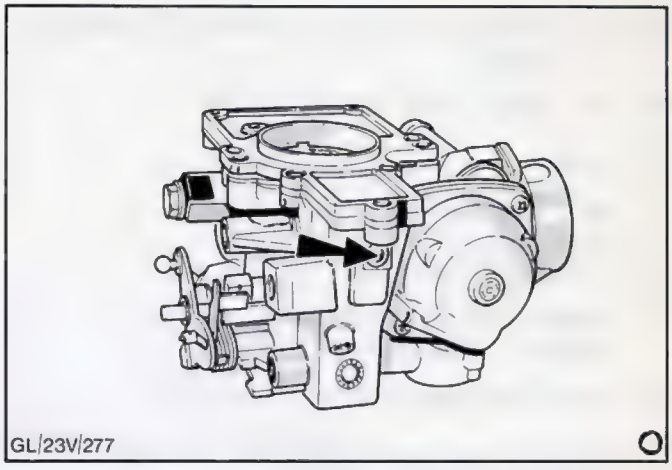


Fig.63. Main metering rod tamperproof plug.

23 244 NEEDLE VALVE - REPLACE

SPECIAL SERVICE EQUIPMENT REQUIRED:

CO Meter
RPM Meter

To Remove

1. Open hood and fit fender covers.

2. Disconnect battery.

3. Remove air cleaner assembly.
Detailed in Operation No. 23 174.

4. Remove seven screws and detach carburettor top cover.

5. Unclip float pin and position float clear of needle valve. Fig.64.

NOTE: It is not possible at this stage to completely remove float.

6. Using long nosed pliers remove needle valve.

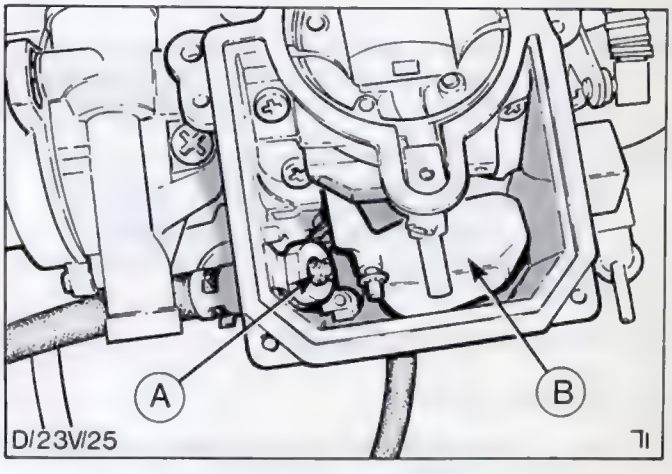


Fig.64. Needle valve removal.
A - Needle valve
B - Float

To Install

7. Position needle valve, float and float pin.

NOTE: Refit needle valve so that spring loaded ball on valve will be in contact with float when petrol is fed into carburettor, Fig.65.

8. Refit carburettor top cover.

9. Refit air cleaner assembly.

10. Reconnect battery.

11. Check and adjust engine idle speed and fuel mixture setting.
Detailed in Operation No. 23 213.

12. Remove fender covers and close hood.

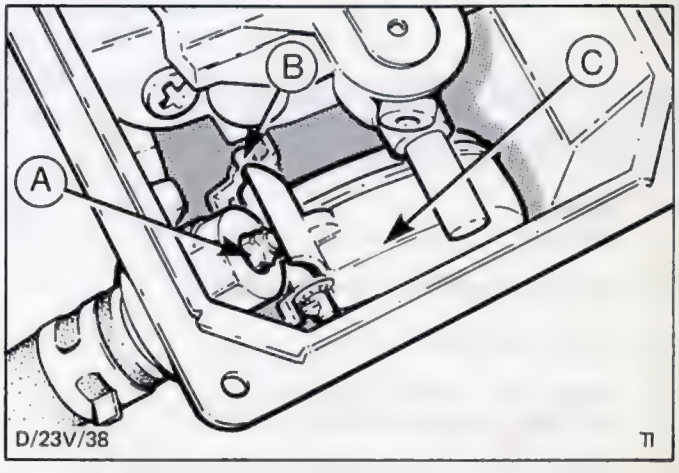


Fig.65. Needle valve installed.
A - Needle valve
B - Float pin
C - Float

23 264 CARBURETTOR CONTROL DIAPHRAGM - REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove carburettor assembly. Detailed in Operation No. 23 224.
4. Clean work area.
5. Remove four cross head screws and detach diaphragm housing, Fig.66.
6. Remove circlip and detach control diaphragm from control lever.

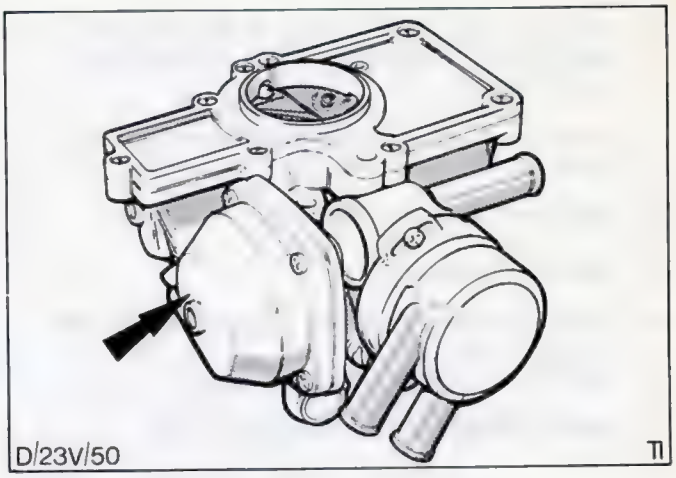


Fig.66. Diaphragm housing.

To Install

7. Connect control diaphragm to operating linkage, install circlip and refit diaphragm assembly, Fig.67. Secure four cross head screws.

NOTE: Ensure that vacuum hole in diaphragm lines up with supply galleries in both carburettor body 'D' in Fig.67, and housing. Also when fitting, hold air valve fully open when tightening screws. This will ensure that diaphagm is not trapped.

8. Refit carburettor assembly.
9. Reconnect battery.
10. Check and adjust engine idle speed and fuel mixture setting.
11. Remove fender covers and close hood.

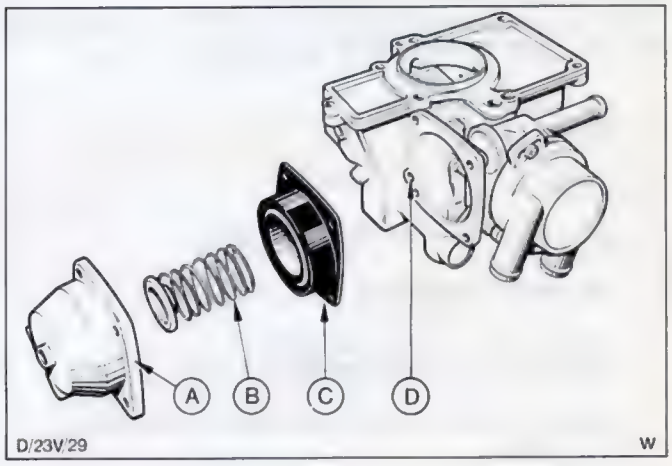


Fig.67. Control vacuum diaphragm assembly.
A - Diaphragm housing
B - return spring
C - Diaphragm
D - Vacuum supply gallery

23 274 AUTOMATIC CHOKE - ADJUST

SPECIAL SERVICE EQUIPMENT REQUIRED:

CO Meter
RPM Meter

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove air cleaner assembly. Detailed in Operation No. 23 174.
4. Remove three cross head screws and detach choke bi-metal coil housing, position clear of choke, Fig.68.

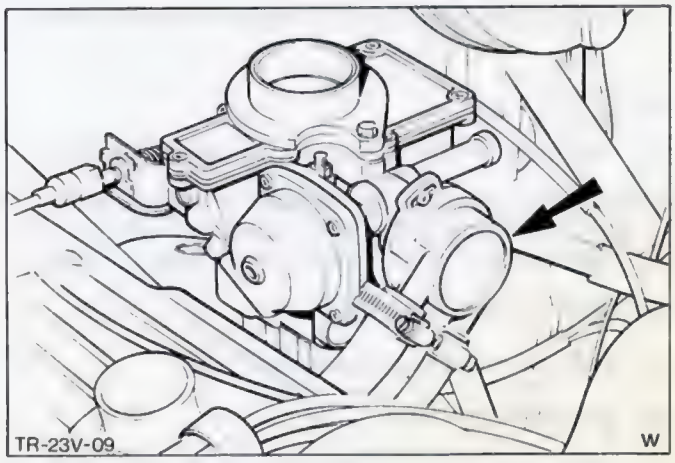


Fig.68. Auto-choke bi-metal coil housing.

5. Check and adjust choke gauging as follows:

NOTE: This adjustment controls the air/fuel mixture or ratio, that is fed into engine when choke is in operation.

i) Using a thin bladed screwdriver carefully prise out tamper-proof plug. Plug location shown in Fig.69.

ii) By looking down hole where tamper proof plug was fitted, Fig.69, turn choke operating lever until drilling in central shaft lines up with hole in carburettor housing.

iii) Position a specified twist drill shank into hole ensuring drill fully locates into choke central shaft, Fig.70. Refer Technical Data section.

iv) Loosen central nut that secures choke linkage to choke shaft, 'C' in Fig.70.

v) With drill in position turn choke lever fully clockwise up to its stop and tighten centre securing nut.

NOTE: Do not overtighten securing nut.

vi) Remove twist drill.

NOTE: Do not fit tamper-proof plug at this stage. Also if after assembly choke does not function it is possible that centre shaft is 180° out.

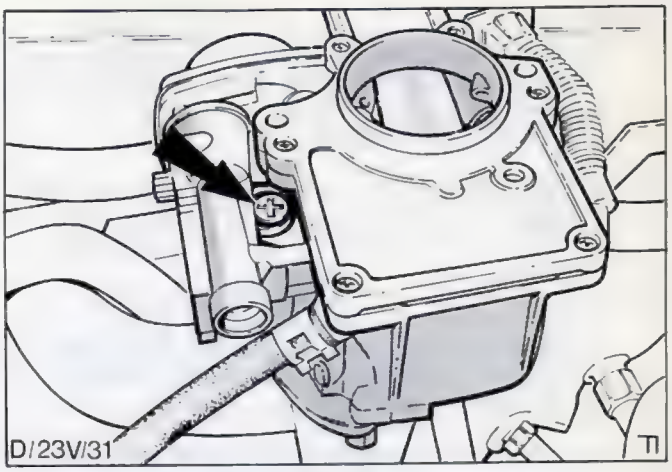


Fig.69. Choke gauging adjustment tamper-proof plug.

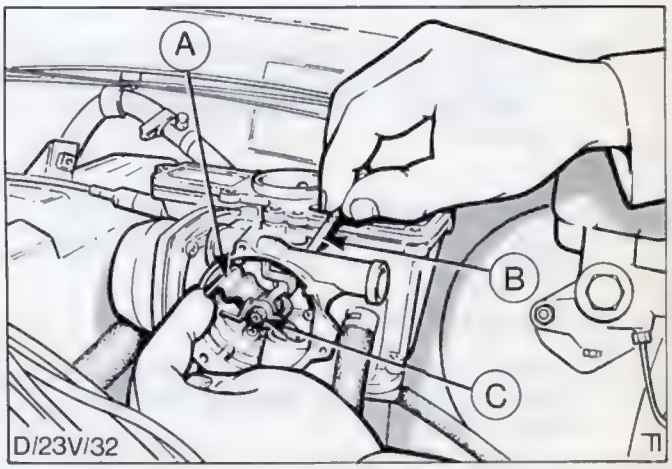


Fig.70. Choke gauging adjustment.
A - Operating lever held fully clockwise
B - Twist drill held fully in position
C - Nut that secures linkage to central shaft

6. Check and adjust choke pull down/fast idle setting as follows:

This adjustment ensures that the vacuum pull down system, which controls fast idle, is operating correctly. A description of how the system operates is shown on page 17.

i) Position a twist drill in the location shown in Fig.71, and using a small pair of pliers bend back pull down operating lever to a position also shown in Fig.71. This sub-operation is necessary to ensure that the lever does not restrict movement of vacuum piston which could make it impossible to set choke in the correct pull down/fast idle position. The drill is required to ensure linkage is not damaged when the pull down lever is bent back. Once lever is bent back remove twist drill.

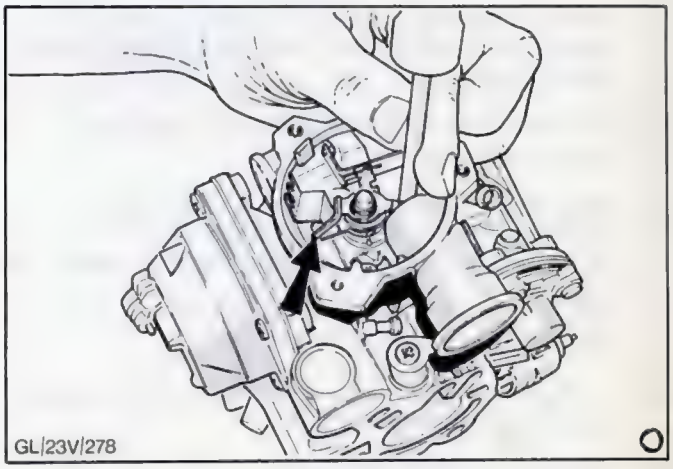


Fig.71. Pull down lever bent back to ensure that correct fast idle position can be achieved.

ii) Whilst looking down choke gauging hole, refer sub-operation five and Fig.69, turn choke operating lever until drilling in central shaft lines up with hole in carburettor housing.

iii) Position a twist drill shank of specified size into choke gauging hole ensuring drill fully locates into choke central shaft.

NOTE: Drill size for adjusting pull down is NOT the same as that used for choke gauging, also size will vary from model to model. Full details are shown in the Technical Data section.

iv) Push vacuum piston to the bottom of its travel and hold choke lever fully clockwise.
Refer Fig.72.

This sub-operation locates choke assembly into the pull down/fast idle checking position.

NOTE: At this stage there must be a clearance between pull down lever and bi-metal choke lever. If not repeat sub-operation i.

v) To adjust bend pull down lever 'C' in Fig.73, so that it just touches bi-metal lever 'A'.

vi) Re-check setting.

vii) Remove twist drill and fit new tamper-proof plug to choke gauging location.
Refer Fig.69.

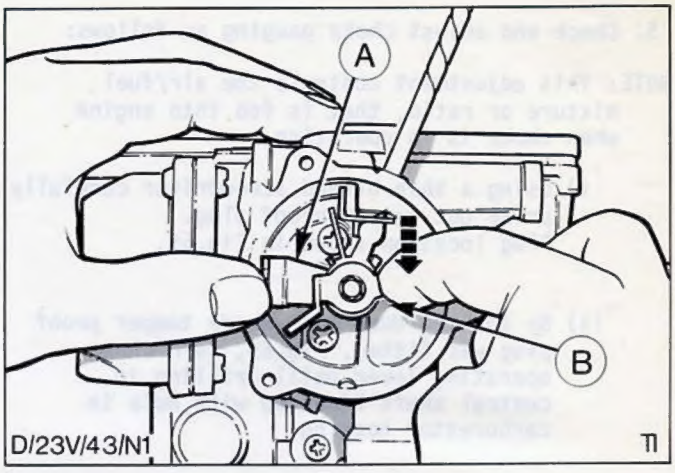


Fig.72. Choke held at pull down/fast idle setting.
A - Bi-metal lever held fully clockwise
B - Vacuum piston pushed downwards to the bottom of its travel

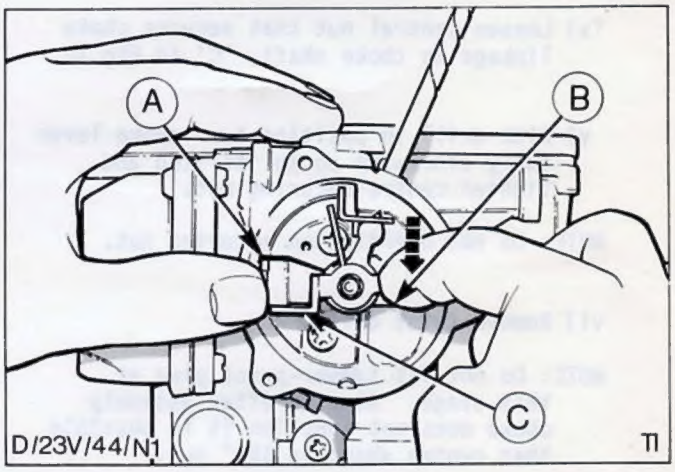


Fig.73. Choke held and correctly adjusted.
A - Bi-metal lever held fully clockwise
B - Vacuum piston pushed fully downwards
C - Pull down lever just touching bi-metal lever

7. Position gasket, connect bi-metal coil to central slot on choke lever and loosely refit choke housing.

NOTE: To aid installation the lower securing screw should be fitted first.

8. Turn choke housing to line up with correct choke alignment mark and secure the three screws. Fig.74, shows housing set up on index.
Choke alignment specifications are shown in the Technical Data section.

NOTE: The choke housing mark to be used is a saw cut not a raised cast line.

9. Refit air cleaner assembly.

10. Reconnect battery.

11. Remove fender covers and close hood.

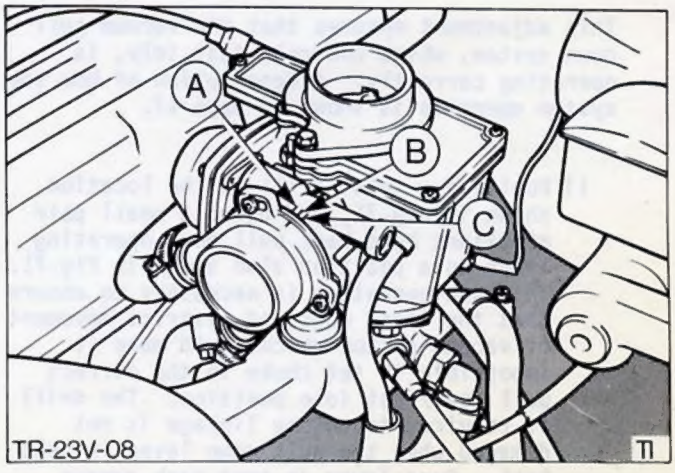


Fig.74. Choke housing alignment.
A - Rich setting
B - Index mark
C - Lean setting

23 276 AUTOMATIC CHOKE REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED:

CO Meter
RPM Meter

To Remove

1. Open hood, fit fender covers and disconnect battery.
2. Remove air cleaner assembly.
3. Disconnect both auto-choke hoses at carburettor.

IMPORTANT: Before disconnecting hoses ensure that cooling system is not pressurized (by removing radiator cap and refitting) and that radiator cap is in position.
Position disconnected hoses with ends facing upwards, this will minimise amount of coolant lost.

4. Remove three cross head screws and detach choke bi-metal coil housing, Fig.75.
5. Remove a further three screws and detach choke assembly, Fig.76.

To Install

6. On new choke, threads in bi-metal housing securing holes are not formed, therefore before fitting assembly tap threads using existing securing screws which are thread forming.

NOTE: Under no circumstances should threads be cut using standard taps, always use the thread forming screws.

7. Also before fitting new choke assembly check unit for binding or sticking and that linkage is not damaged.
8. Using a new gasket place choke assembly into position and secure.
9. Position gasket, connect bi-metal coil to central slot on choke lever and loosely refit choke housing.

NOTE: To aid installation lower securing screw should be fitted first.

10. Turn choke housing to line up with specified choke alignment mark and secure three screws. Fig.77, shows housing set up on index.

NOTE: Choke housing mark to be used is a saw cut not a raised cast line.

11. Reconnect choke hoses to choke bi-metal coil housing.
12. Refit air cleaner assembly, reconnect battery, remove fender covers and close hood.

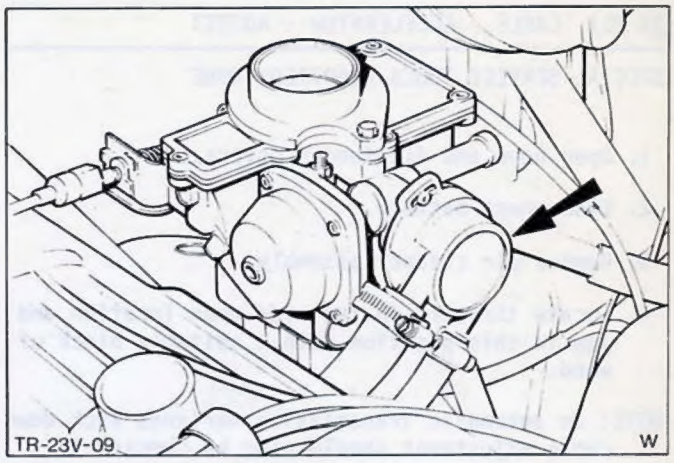


Fig.75. Auto-choke assembly.

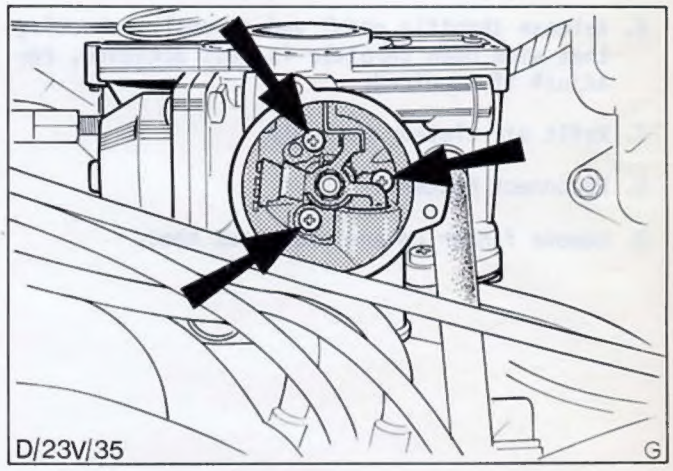


Fig.76. Choke assembly securing screws.

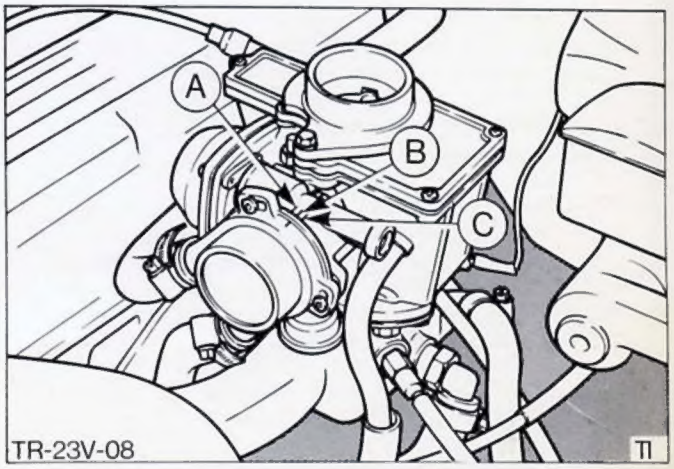


Fig.77. Choke housing alignment.
A - Rich setting
B - Index mark
C - Lean setting

23 811 CABLE - ACCELERATOR - ADJUST

SPECIAL SERVICE TOOLS REQUIRED: NONE

1. Open hood and fit fender covers.
2. Disconnect battery.
3. Remove air cleaner assembly.
4. Locate throttle in the wide open location and jam in this position with a suitable block of wood.

NOTE: On automatic transmission variants kick down cable adjustment should also be checked to ensure it does not prevent wide open throttle being achieved.

5. Wind back adjusting sleeve to a point where carburettor linkage is just in the fully open position, Fig.78.
6. Release throttle pedal and re-apply, checking that wide open throttle is just achieved, re-adjust if required.
7. Refit air cleaner assembly.
8. Reconnect battery.
9. Remove fender covers and close hood.

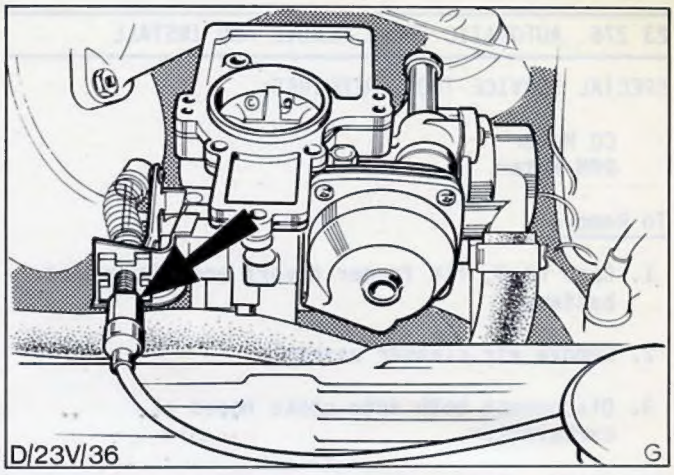


Fig.78. Accelerator cable adjusting sleeve.

TECHNICAL DATA

FORD V.V.
CARBURETTOR

Carburettor Part No.	- 1.6 OHC	79HF-9510-KHC
	- 2.0 OHC Manual Transmission	79HF-9510-KNA
	- 2.0 OHC Automatic Transmission	79HF-9510-KKC

Idle Setting

Idle Speed	800 rpm ± 50 rpm
Idle Mixture All OHC	1.0% CO ± 0.5%

Main Metering Rod

Code No.	1600 OHC	FBM
	2000 OHC Manual Transmission	FCS
	2000 OHC Automatic Transmission	FBZ
Metering Rod adjustment		
Rod backed off by;	1600 OHC	2,50 Turns.
	2000 OHC Manual	2,00 Turns.
	2000 OHC Automatic	2,25 Turns.

Choke System

	1.6 OHC	2.0 Manual	2.0 Automatic
Choke gauging (Twist drill)	3,4 mm (0,135 in)	3,4 mm (0,135 in)	3,4 mm (0,135 in)
Choke fast idle/pull down (Twist drill) (Choke lever held fully)	4.0 mm (0,158 in) CLOCKWISE	4,0 mm (0,158 in) CLOCKWISE	4,0 mm (0,158 in) CLOCKWISE
Choke housing alignment	On Index	On Index	On Index